The Builder.

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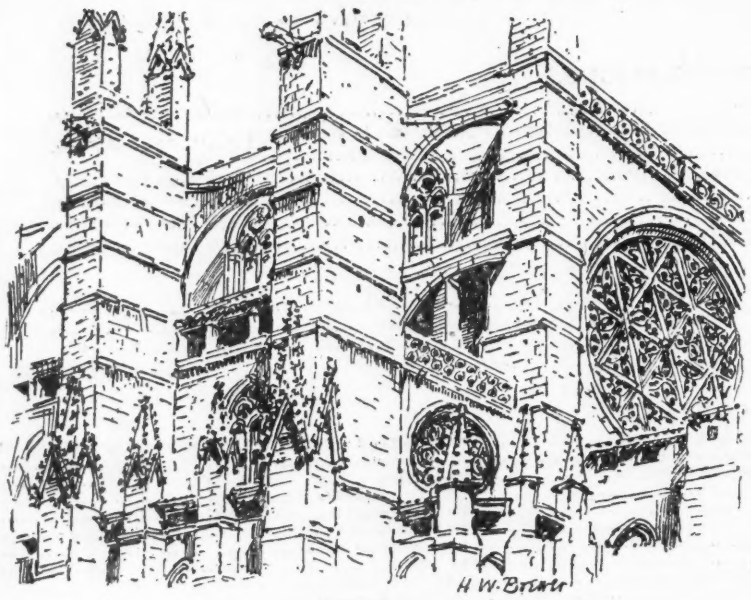
Hints for Churches in Hot Climates.

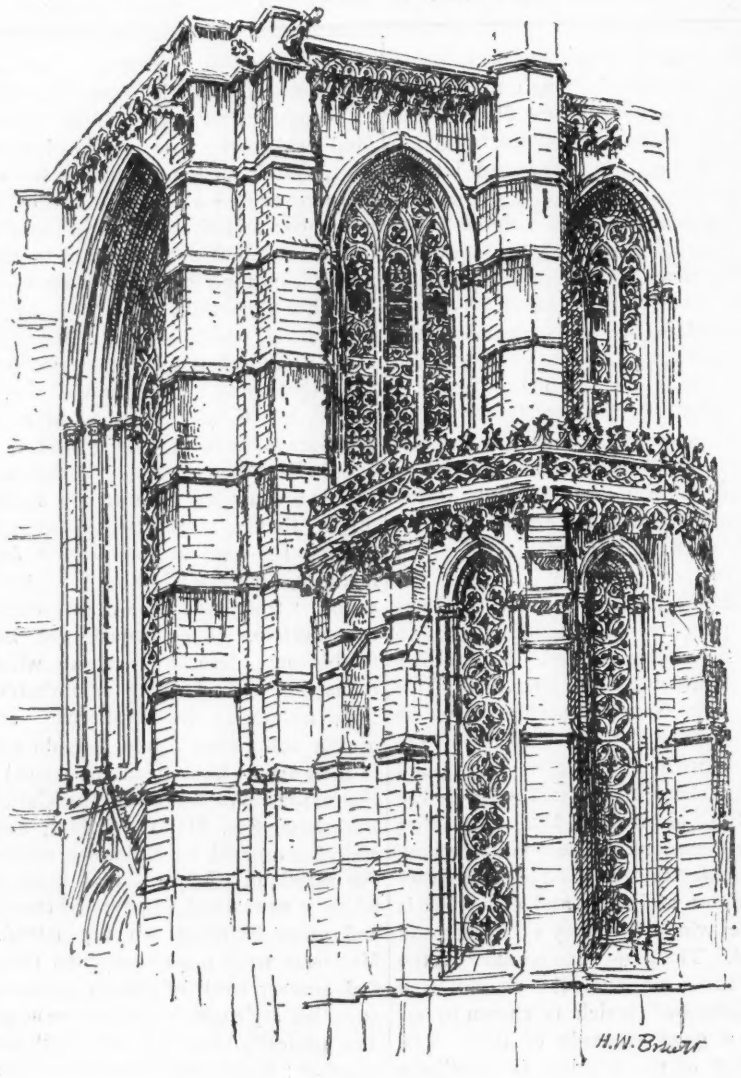
THE great number of churches which our English architects build in such colonies as East India, the West Indies, Ceylon, &c., constitute a sufficient excuse for making a few remarks upon the treatment of Gothic churches in hot climates during the Middle Ages. Something has undoubtedly been done of late years in the way of an attempt to modify our English Gothic in such a way that although the churches erected in India, &c., should recall ideas of home, and associations dear to all Englishmen who are compelled to live away from the land of their birth, they should yet be appropriate to the climate where they are erected; but a careful study of some of the ecclesiastical buildings in Spain, Portugal, and the islands of Majorca and Cyprus, will give excellent hints, which will suggest practical modifications that may be of considerable value in the erection of such structures. It may be said, why not include Italy and Sicily? There are two reasons. In the first place, attention has so frequently been called to Italian Gothic; and in the next place Italian Gothic would not have the desired effect, because it is in every way so opposed to our English Gothic that a building erected in that style would certainly not recall "home" to the exiled Englishman. But with many of the churches in the Peninsula the case is different; they are so evidently modifications of Northern Gothic, adapted to suit the South, that they seem to show us what the Mediæval architects of England would have done if placed in a similar position to our own with regard to our colonies in hot climates.

The great churches now converted into mosques at Famagosta and Nicosia are evidently the works of northern architects, adapted to suit a southern clime. Famagosta Cathedral would appear to have been designed by a German, and bears a strong resemblance to Ratisbon, while Nicosia is far more French in style. The great open-vaulted bay at the west end forming an external gallery in front of the west window of this church must have been a fine feature, and have given the deep shadow so valuable in a burning climate. Although the indications of this arrangement are distinct, the design was either never completed, or ruined, when the building was converted into a mosque. At both Nicosia and Famagosta there would appear to be indications of the windows being blocked and the blocking masonry pierced with small apertures filled with minute tracery. The same treatment is to be noticed in the cimborio and in the clearstory windows of the nave of the beautiful cathedral of Tarragona, in Spain.

The proof that all this architecture is of northern origin is to be found in the fact that in every case there is an attempt to imitate the magnificent system of fenestration which is so marked a feature of northern Gothic. To such an extent is this carried that in the vast cathedral of Palma, in the island of Majorca, the clearstory windows are mere panelling inside and out, no portion of them being pierced. In the aisle and apse windows, the tracery alone is pierced. The same treatment is to be observed in many of the windows of the Franciscan church of St. Peter, Palma, and others in the island of Majorca; also in the cathedral Sta. Maria del Mar, and other churches in Barcelona. There is something rather unsatisfactory in this idea. Another plan carried out at Palma and elsewhere is to make the window tracery very close and complicated. The great rose window at the east end of the nave, over the chancel arch at Palma Cathedral (which is shown in our sketch) is a good example of this. The internal effect of this window is peculiarly fine; the openings of the tracery are too small and complicated for regular stained-glass, but it is filled with glass of various tints symmetrically arranged. We know of no other example of Mediæval glazing of this description, but it seems peculiarly suited to this severe and solemn building. It will possibly suggest itself to our readers that the builders of Palma Cathedral may have borrowed an idea from the Moors, and if the work had been met with in the neighbourhood of Seville or Toledo—or, in fact, anywhere on the mainland of Spain—this might have been a possible solution of its origin; but one peculiarity of the Mallorcan architects and their works was that they never, under any circumstances, took their ideas from the Moors or Moresque art. Out of about a dozen churches in Palma which are either Mediæval in construction, or exhibit remains of Mediæval architecture, whether Romanesque, Early Gothic, or Late, we have been unable to discover the slightest trace of Moorish influence; and although the Moors were for some time masters of Majorca, scarcely any remains of their work is to be discovered. Whether they built very little, or whether the hatred which the Mallorcans had for them prompted the latter to destroy everything that could remind them of the Moorish occupation, it is impossible to say. The Mallorcans were a strong and a strange people in a very isolated position, and such people are apt to have strong feelings and display them in a very marked manner, which is even the case at the present day. For instance, the Mallorcans dislike to be called "Spaniards," and are exceedingly conservative. They would not be likely to borrow ideas from those whom they detested; and it is a remarkable thing that, although the Mallorcan architects greatly influenced Spain, they do not seem in their art to have been influenced by the Spaniards. We notice in the Cathedral of Barcelona, Sta. Maria del Mar, and other churches erected by Mallorcan architects on the mainland of Spain, that same severity which is so marked a feature of the churches and other buildings on the island. The Mallorcan work more resembles the plainer and severer work of North Germany than any other style with which we are acquainted. The perfectly plain and very lofty octagonal columns; the absence of triforium; the stern and almost Puritanical severity, remind one of the churches on the banks of the Baltic. The immense boldness of the construction and vast dimensions of the cathedral at Palma also remind one of Germany. Of course, the closeness of the tracery, and other features to which we shall call attention, arose from climatic influences, and certainly the great rose window at Palma offers a good hint for southern Gothic work. It is placed over the chancel arch. The chancel, though about 80 ft. to the vaulting, is much lower than the nave; the latter is said to be about 145 ft. high to the crown of the arch, but when it is stated that the nave is over 60 ft. in width without measuring its aisles, and with aisles and chapels together is 190 ft., some notion may be obtained of

Palma, Majorca.





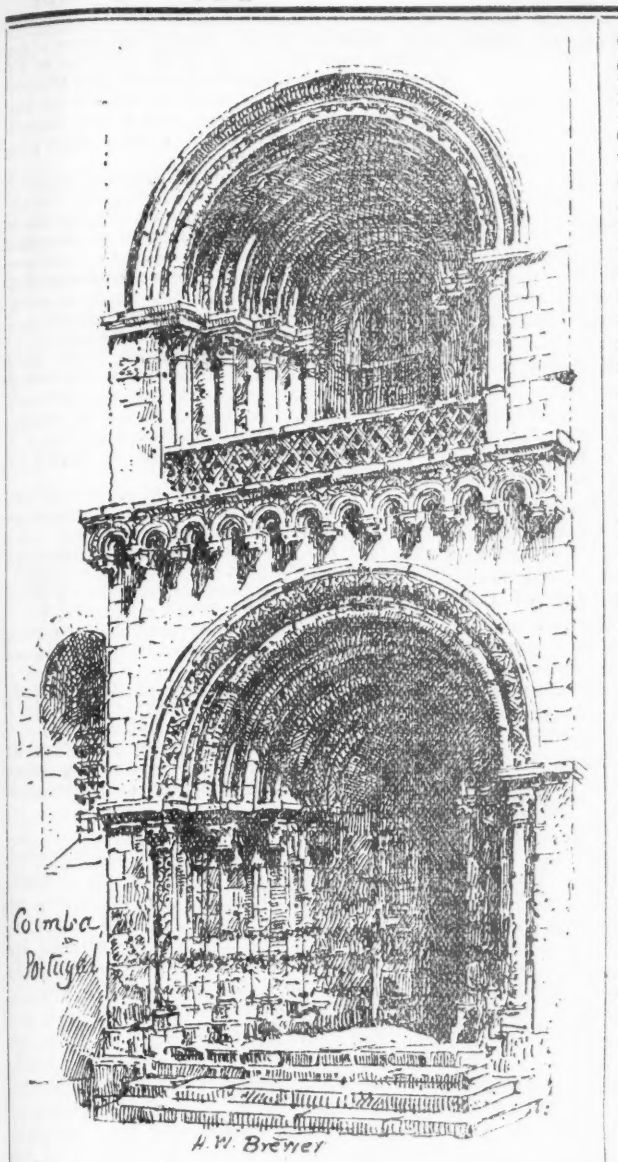
Batalha, Portugal.

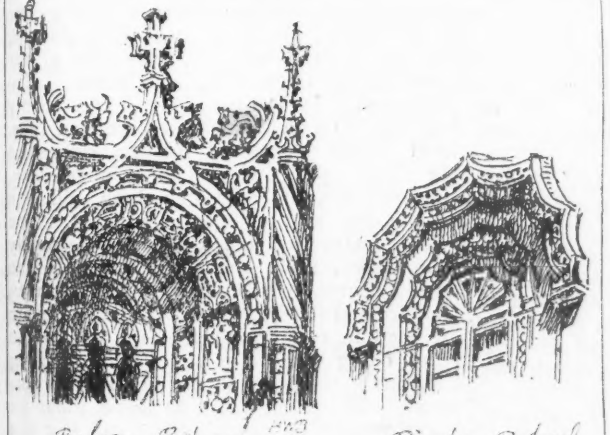
Batalha.

the dimensions of this gigantic edifice. The double roof over the aisles, with the space opened between them, is another admirable arrangement for a hot climate, as the current of air between the two roofs is certain to keep the interior of the building cool. At the old cathedral of Coimbra, in Portugal, all the windows and doorways have very deep reveals, externally; this, of course, necessitates immensely thick walls, and where such a luxury can be afforded, it is a perfect solution of the difficulty. The fine effect of the suite after suite of mouldings and shafts, which is obtainable under such circumstances, may be seen from our sketch of a portion of this Romanesque church. At Belem the same effect is gained in a very much later style. At Pinha, near Cintra, heavy projecting hoods give shadow to the windows; this, however, is not quite satisfactory in effect.

The noble Abbey Church of Batalha, the "Westminster Abbey of Portugal," a building commenced in 1386, shows many excellent ideas for excluding the glare and heat, but at the same time preserving the general idea of the "fenestration" of Northern Gothic. The parapets are boldly corbelled out from the walls, so as to give the effect of balconies, and to cast long shadows upon the walls. The windows are deeply set in, and the tracery placed almost level with the inner surface of walls. There are often as many as three distinct suites of mouldings and shafts to the jambs.

In addition to their ordinary tracery, the windows have subsidiary tracery, which spreads itself over the whole window, right down to the sill. As this is very delicately treated, the effect is rich and intricate. Of all the hints offered for the treatment of churches in hot climates this seems to us to be the most valuable and the one that is capable of the most varied and beautiful treatment. If, for instance, the outer or great plane of tracery is kept geometrical, and the inner or smaller plane curvilinear, or like "foliation," a very charming effect might be obtained. There is no reason why the subordinate tracery should not be of wood.





In most of the Spanish churches the windows are placed rather low down, so as to leave the vaulting in shadow. At Avila the triforium space is more than ordinarily deep, a treatment which can be applied to very lofty churches. Many suggestions may be culled from Northern churches; for instance: the arcading *outside* the clearstory of the choir at York Minster.* The great rose window to the north transept at Amiens has also an arcade *outside*, the rose of course being glazed and the arcade left open; the reverse of the treatment of the rose windows at the ends of the eastern transepts at Canterbury. At Ratisbon Cathedral the tower windows have arcades carried right in front of them, very like York—a kind of suggestion of double tracery with the inner plane glazed. As a rule in England the tracery stops with the springing of the arch, but at Dorchester, in Oxfordshire, and the east window of S.E. chapel of Christ Church, Oxford, it is carried down very low. At St. Barbara, Kuttenberg, Bohemia, the same thing is done, but in a more skilful way, as the lower tracery does not in this case look as if it had fallen down from the head, which is the defect at Dorchester and Oxford, but is treated quite independently of the tracery in the head. The filling-in of some of the belfry windows of the Somersetshire towers is of stone arranged in tracery patterns; Huish Episcopi and Kingsbury are examples. A similar arrangement seems to have formerly existed at Magdalen Tower, Oxford. Of course, these windows are not glazed, and the treatment is somewhat similar to the subordinate tracery at Batalha.

The later Gothic architects of Spain gave up all idea of imitating the fenestration of Northern churches, and in such churches as Salamanca and Segovia, with their very small un-traceried windows, there is little to remind one of the northern origin of Spanish Gothic. It may be doubted whether this is not really the more appropriate treatment for a southern church. Indeed the effect of the interiors of these later Spanish churches is remarkably impressive and solemn, and to walk into one of them after the glaring sunlight of the streets is singularly refreshing. So delightful, in fact, is the sensation, that in Renaissance times they absolutely built churches in Majorca without windows, and in one of the old Gothic churches at Barcelona, the Renaissance men blocked up all the windows. Probably the old Roman basilica churches were very nearly dark, as the windows appear, according to Rahoult de Fleury, to have been very small and filled in with heavy iron bars. Some of the early churches in Italy and Sicily—Palermo Cathedral, for instance—have some of the windows filled with thin slabs of alabaster instead of glass. No doubt such churches were supplied with those singular Lampadaria, consisting of a vast number of diminutive oil lamps hung on to metal frames, such as are to be seen at St. Mark's, Venice, and some Greek churches. The notion, however, of a thoroughly dark church is not pleasing to Englishmen, and one constructed after such a fashion would not at all satisfy the majority of our countrymen who, although they may be in the sunny south or the burning plains of India, like to see something that reminds them of the old churches at home with their great Gothic windows. Even the cathedral at Calcutta, with its questionable Gothic detail, enjoys a certain amount of popularity in India, on account of its supposed resemblance to York Minster(!); and several architects who have built churches in India have told us that their clients always ask them not to adopt an Oriental style, but to keep to English or, at any rate, European Gothic. The task, therefore, which the architect has to perform is to build churches which shall be European in architecture and general form, but to modify the style in such a way as to suit a hot climate.

In all countries and at all times we find men attempting to introduce their own native architecture into other lands, but where they did so without sufficiently modifying it to suit those countries, like all exotics, the works so executed simply remained isolated examples of curious experiments. Milan Cathedral is a case in point. Though the largest Gothic church in Italy and in some respects one of the most magnificent in Europe, yet it had little or no influence upon the architecture of Italy. At Subiaco are works executed by Germans that are purely Suabian in character; and at Echternach in Luxembourg the Abbey Church has an Early English east end and clearstory, but there is no other similar work anywhere about the district. All which shows how necessary it is to modify architecture introduced from one country into another, if it is really to take root in the soil of its adoption.

* This is shown in the view of York Minster, published in the *Builder* "Cathedral Series."

NOTES.

IN regard to the discovery at Durham Cathedral, Mr. C. C. Hodges, who has given much attention to the Cathedral and its history, writes:—"It may be well to remove a wrong impression, which, from Mr. Robson's letter in your last issue, seems to exist, that the first Norman work in Durham was not vaulted. We have not only documentary evidence, but that of the building itself, that both choir and apse had a Norman vault as early as 1104, and that the whole church was vaulted by *c.* 1130. Durham was therefore the earliest Norman vault in England, over the main span as well as the aisles."

THE local authorities of the Metropolis have this winter shown more perception of the duty now placed on them to clear the pavements. For some time it appeared as if these bodies were still under the impression that the duty devolved on the householders of London. The work of clearing the snow away might, however, have been done more quickly and more efficiently than has been the case in the residential parts of London. Every hour that the snow is left to be trampled on makes it more difficult of removal. Further it is noticeable that the spades provided for the purpose are usually far too light. When snow is fast fixed to the pavement a certain amount of weight is necessary to detach it. It is to be hoped also that before another winter comes round a more systematic organisation will have been created to deal with this matter. The various streets and squares should be mapped out and placed in charge of certain workmen, so that on the first fall of snow the work of removal may be simultaneously commenced in different parts. Nor can we regard the work as being properly done when the snow is left piled in heaps by the side of the pavement, on to which the passer-by must step if he crosses the street.

THE annual report of the fires in London again shows several improvements in its arrangement. The short descriptions of notable conflagrations have been supplemented by notes on all the fires classed as serious. There were 151 of these last year, and the extent and the number of appliances used are given in each case. It is a pity that no particulars are given as to the construction of the buildings attacked. Unfortunately the scope of the brigade is still limited to the extinction of fires, so that little new can be done by its officers for fire prevention except in the form of the usual summary of the "causes of outbreak." This summary, however, only treats of 2,198 of the 3,061 fires of last year, which does not speak well for the attention given to

this subject; no less than 863 fires are classified under "unknown causes." Last year there were 16 notable fires. Of these 8, curiously enough, occurred in couples: on February 24 and 25, April 3 and 5, September 12 and 14, and November 9 and 10. The most disastrous one, however, occurred alone in June at Tabernacle-street, E.C. In this instance no less than forty-one steamers were at work, and nearly all the available men attended, leaving large areas of the Metropolis unprotected. Though the force has been strengthened, it is still undermanned. The strain on the brigade has been most severe at times, so that the formation of properly trained and responsible part-paid reserves might be recommended. It is the best makeshift where the ratepayers do not wish to pay for the necessary number of regulars. London requires about 1,500 firemen at present, and only has 791. Sir Eyre Massey Shaw, in 1872, said 931 were necessary. The report is signed by the chief officer, Captain Simonds. Mr. Gamble, the second officer, is to be congratulated on the able way in which it has been compiled.

THE committee appointed some two months ago to consider the Light Railways question appear to have been fully convinced of the desirability of encouraging the construction of light lines, and of the necessity for some relaxation in the existing rules and regulations relating to them. The report of the committee was presented last week, and bears twenty-two signatures, six members expressing divergent opinions upon different points. The lack of progress in the construction of light lines is attributed partly to the conditions which the Board of Trade have considered it their duty to impose for the public safety, and to the want of latitude left to the Board by law. This appears a fair and reasonable way of alluding to the difficulties undoubtedly occasioned by the intervention of the Board; but a clause in the minority report asserts that "it is well known that obstacles to the construction of tramroads and tramways have been unnecessarily interposed by the local authorities and the Board of Trade," and proceeds to recommend that the Board be invested with full power to modify or dispense with any of the existing restrictions on the construction and working of tramways. This would certainly simplify matters, but was doubtless looked upon by the majority as rather too sweeping. The committee were also divided as to the desirability of permitting public bodies to subscribe or guarantee capital. The minority recommend that County Councils and other local authorities should be granted these powers; but the report refrains from giving an opinion, the committee remarking that they doubt whether this comes within the terms of the reference to them. This is an important, if not vital, consideration, but it will doubtless be fully discussed in the House of Commons when the matter is brought before Parliament.

THIRTY-EIGHT designs have been sent in for the Durham County Council Buildings Competition, the decision on which it was expected would be made known by this time. The competitors, however, have only received a circular informing them that no result has been arrived at, and that the awards cannot be made yet, owing partly to the illness of the assessor, Mr. J. Vickers Edwards, and partly to the ensuing election of the County Council and consequent change of the committee. The first reason is, of course, intelligible, but we imagine the second is the really urgent one; and it is rather bad management on the part of the Council, who knew of course when the election would come on, not to have arranged the competition so that it could be settled by the committee who had it in hand. The indefinite delay is very unfair and vexatious to the competing architects, from more than one of whom we have received letters of complaint.

THE danger of having wires laid in conduits which necessarily entail draw-boxes or manholes has at length been recognised by electrical engineers. They can no longer blind themselves after last week's explosions at Rochester, Eastbourne, Newcastle, Dover, and on Southwark Bridge; and the recent explosions at Euston-road, Cannon-street, and in the Haymarket, are still fresh in everyone's memory. Electrical engineers are too apt to forget that long before they appeared on the scene there were often leakages from the gas-mains, and it is clearly their duty in the interests of public safety to guard against possible gas explosions in their conduits. The accident at Newcastle was in a draw-box for underground telephone wires, so what we have said applies to conduits for telephone and telegraph wires as well as to those for both high-pressure and low-pressure supply. The ventilation of the conduits would be at best a doubtful remedy, as it might draw out the gas from any leaky point in the gas-mains, and only one volume of gas to seven of air is required to make a most explosive mixture. Compressed air has been suggested as a remedy, and this would be effectual if it were not a difficult and almost impossible one to apply to a large network of conduits. Sir David Salomons has suggested filling up all the large spaces with sand or slag wool, and this plan is to be tried by the City of London Company. The difficulty of getting the sand out of the draw-boxes, when it is necessary to get at the mains, will be partly overcome by putting the sand into differently sized sacks, the larger one to fill up the bottom, and the smaller ones the remaining spaces. This seems promising, and would make such destructive explosions as the one on Southwark Bridge impossible. The safety of the public would be best provided for by the Board of Trade laying down stringent regulations regarding the making of conduits in the neighbourhood of gas-mains; just as in house lighting the insurance companies, with their strict fire rules, have done more to do away with the jerry wireman than any amount of exposure in the technical papers.

WE have received from Sir Isaac Holden, in pamphlet form, a letter addressed to him by Mr. Keith in regard to the subject of the ventilation of the Houses of Parliament, and which is evidently intended to press further the need of adopting the improvements suggested by Mr. Keith in his Report, which was the subject of an article in this journal under date April 28, 1894. The main point of the letter is directed towards the importance of adopting mechanical means for ensuring and regulating the extraction of vitiated air from the House, in place of what we called (in a sentence quoted in Mr. Keith's letter) "the clumsy and antiquated extract force of the upcast shaft and fire," which does not act equally in all weathers, and which cannot be varied in accordance with the state of the House and the numbers in it at any particular time. Some of the opinions expressed on this point in the course of examinations by the Committee charged with the subject, and quoted by Mr. Keith, are rather extraordinary; *ex. gr.*, it appears from these quotations that Mr. Taylor, the Surveyor to the Office of Works, actually replied to a question on the subject to the effect that the heated extract shafts would act more powerfully in warm weather than in cold weather; the exact contrary, of course, being the case. At the conclusion of his letter to Sir Isaac Holden, Mr. Keith sums up the existing defects in the ventilation as follows:—

"(1) That there is insufficient change of air in summer.

(2) That the air admitted in winter is devitalised by being passed over scorching steam-pipes, &c.

(3) That although a large volume of fresh air is being constantly blown through the centre of the Chamber from floor to ceiling, the extraction of the vitiated air in the House of Commons is so arranged that only members on the front benches get any material benefit; while those who occupy the side and end benches are invariably under a slight pressure of vitiated atmosphere.

(4) That the sewer gas of the drainage system of the Houses of Parliament being openly liberated into the lower sections of the main upcast shafts which also ventilate the buildings, it happens, that the sewer gas finds its way into the Committee Rooms, and into both Chambers, whenever there are any back draughts from these shafts, or, when, so far as the House of Commons is concerned, one ventilating furnace may pull against the other.

(5) That the system of extraction in use, being entirely dependent on the difference of temperature between the outside air and that in the upcast shafts, it follows, that in warm weather the ventilation is not only most ineffective, but there is a tendency to have down draughts of vitiated air impregnated with sewer-gas.

(6) That the fresh air being admitted into both Houses and to the division lobbies through gratings on the floor, it is impregnated with dust, &c.

(7) That the atmosphere of the corridors and committee rooms, &c., is subject to contamination, owing to the weak and variable system of extraction from the adjoining water-closets, urinals, &c.

(8) That the atmospheric conditions are much worse in the House of Commons than in the House of Lords.

As regards the remedies, they are fully set forth in my report and in the preceding pages, and, I may repeat that all the recommendations and suggestions made, can, under proper supervision, be quite easily carried out by the regular Engineering or Office of Works' staff employed at the Houses of Parliament."

THE new Turkish baths recently opened at Broad-street House by Messrs. Nevill are of interest to architects as showing how confined spaces such as basements and the like can be utilised for such purposes as this in the best possible manner. The baths are situated partly beneath Broad-street House and under Alderman's Walk, from whence they are entered. The entrance forms part of a kiosk, in the upper portion of which are the water-tanks, masked by a Moorish treatment of wall-surface, and surmounted by a cupola in the same style. These features, and the exterior generally, are executed in terra-cotta and coloured glazed faïence. The planning of the baths themselves, consisting of the frigidarium, tepidarium, calidarium, radiating-room, lavatorium, &c., is cleverly arranged on a somewhat confined site, and which presented certain difficulties in this direction. The plunge-bath, shower-bath, and Russian bath, although small, are also compactly situated. The chief feature of the work, architecturally considered, is in the interior, where the walls, beams, and columns are encased with faïence and tile-work, in which the joints are worked in to form part of the design, the tiles being shaped in various inter-locking designs in the Moorish manner for this purpose. We think there is some room for development in this direction, and that this is a treatment more applicable to the material than the painting of coloured surfaces, which are broken by the joints of the material. The girders are cased in the same manner by the keying of the adjoining tiles together. The wood fittings are of teak, and contrast well with the coloured tile-work. The architect is Mr. G Harold Elphick, and the tile-work has been executed by Messrs. Craven, Dunnill, & Co., from the architect's designs.

THE London and Provincial Builders' Foremen's Association is a small society representing a class of men who up to the present have had no means of intercommunication. The society has been lately formed for meeting together and discussing matters which come within the province of an ordinary builder's foreman, and for the reading of papers bearing on these subjects. On Saturday last at the Memorial Hall, Farringdon-street, Mr. G. Barclay, the general foreman of the Works Department of the London County Council, read an interesting paper on "Roofs and Roofing," and if we may take it as a sample of the

kind of communication which the Association requires in this direction, we should say that a great deal of good must come from the discussion of such-like subjects by practical men. We wish the Association every success, believing that its members should be able to help largely the production of good and sound work in the building trades.

IN the *Builder* of November 17 of last year (page 348), we commented on the unfair and illiberal conditions issued to architects for a competition for a new school for the School Board of Weston-super-Mare. The result seems to have been much what might have been expected from such a beginning. Though no assessor was appointed in the first instance, it appears that subsequently, owing probably to some pressure put on the Board by intending competitors,* it was decided to appoint an assessor, and Mr. E. R. Robson was appointed, than whom no more competent person could be found for a school competition. At the meeting of the committee last week, it was stated that the assessor had recommended design No. 15, and the Chairman, though he admitted that he had been adverse to the appointment of an assessor (for what reason?) loyally expressed the opinion that having appointed him they ought to abide by his judgment, and one or two other members supported this view. There seems however to have been a pre-determination from the first, on the part of a majority of the committee, to select No. 3, which had been disqualified by the assessor on a technical point, as well as for serious defects in plan;† and after an acrimonious debate, in which those who opposed the Chairman supported their cause by a good deal of abuse of Mr. Robson, a majority voted for No. 3, which was "found to be" by Messrs. Price and Wooler, local architects. We have always maintained that those who are about to spend their money on a building have a right to make their own selection in the last instance, if they have good reason for being dissatisfied with the design recommended by the assessor; though, as we have also said, in the majority of cases they will probably have made a mistake in their own interests in doing so. But when we find that the argument is carried on by discrediting altogether the talents and judgment of so competent an assessor as Mr. Robson; that there is an evidently predained preference for a design by local architects; and that the senior partner of the selected firm is (so we are informed) the Surveyor to the School Board, we know pretty well what to think. About fifty architects entered into this illusory competition, in which it is tolerably certain that none of them had a chance from the first, and their time has been scandalously wasted. If the Board meant to appoint the local firm, why did they not do it at first, instead of going into this farce of a competition?

ARCHITECTURAL ASSOCIATION. DISCUSSION SECTION. SESSION 1894-5.—The sixth meeting of this Section was held at 56, Great Marlborough-st., on the 6th inst., when Mr. Harry Sirr, A.R.I.B.A., read a paper on "Domestic Metal Work." The paper was illustrated by a fine collection of sketches and metal objects lent by Messrs. Mackmurdo, Hugh Stannus, May, Hooper, Guy Dawber, and Millard. In the discussion which followed the paper Messrs. Greenop, Hopkins, Fellowes-Prynne, Rathbone. Garbutt, Guy Dawber, Hooper, and W. Henry White, the Chairman, took part.

* Since the above was written, we have been informed that the Bristol Architectural Society had issued a circular warning its members not to compete; this got into the hands of the School Board, who then made a show of amending the conditions.

† The following quotation from Mr. Robson's report has been sent to us:—"Although attractive at first sight, the scheme does not bear examination. The cloak-rooms are badly placed, and occupy positions most valuable for class-rooms. They also open into the halls, a plan bad on sanitary and other grounds. The numbers provide sixty more places for girls than are required by the conditions (a violation). Another grave defect is the poor position of the class-rooms, too far removed from the centre, and not under easy supervision. . . . The infant school would be found very inconvenient in work, two class-rooms being much too large, and two others of awkward size," &c.

THE ADVANCEMENT OF ARCHITECTURE.*

BY PROFESSOR AITCHISON, A.R.A.

THE question is, how the advancement of architecture is best to be compassed? Architectural advancement is dependent on many influences, two of the most important being these, that the desires of the nation at the time should run in an architectural direction, and that they should require the embodiment of the highest aspirations of the time. When such desires have prevailed there have been great architectural epochs, and there has been oftener than not at such times an emulation to surpass the grand buildings of antiquity, or those of the greatest nation of the day.

I do not think that these motives are predominant now; in fact, I should not only say that no building of importance was erected with such a view, but that such motives could, with difficulty, be made comprehensible to those in power.

If a public building be wanted it is wanted for some definite practical purpose, and mostly for a commonplace one, such as to house more clerks or to preserve a collection, and those who order it think that if it must be done it may as well be done fashionably. If society is to have a different view impressed on it, if it is to be made to feel the supreme importance of architecture to a nation, and that sublimity is the highest achievement of architecture, it will be a long and slow process, even if it be in the power of any man, or small group of men, to greatly influence public opinion.

I do not imagine that sublimity in buildings is not desired—no nation is indifferent to the opinions of the rest of the world as to its possessions, although it may be indifferent to them itself; but it would be slow in comprehending that to get a sublime building, a sublime idea is wanted to be embodied, and that the keen appreciation and admiration of his work is not only the architect's highest reward, but also the main stimulus for its production. Milton might support getting nothing for his "Paradise Lost," but would never have endured the study and labour necessary for its production, if he had not felt that his countrymen would appreciate and be proud of his achievement, and that he would take his place among the great poets of the world.

There are, however, instances within the last century and a-half of a few men influencing society generally, and this was shown by the demand for copies or paraphrases of Greek and of Gothic architecture. The Greek fashion was mainly due to the travels of a few influential and distinguished men in Greece, to the excellence of Greek architecture in its native country, to the importation of some of the finest Greek sculpture, to the publications of the Dilettante Society, and to literary advocacy, in which Professor Cockerell played a conspicuous part. Gothic came into vogue by the gradual opening of people's intelligence to the merits of the old structures they had in this country, often before their eyes; by the advocacy of Horace Walpole, of Rickman, and of Augustus Welby Pugin, and subsequently by the impassioned praise of Gothic by the Cambridge Camden Society, by Mr. Ruskin, by Sir Gilbert Scott, by Burges, and by Street, and to some extent to the ground being prepared by the writings of Sir Walter Scott, Victor Hugo, and others.

Since those days we have begun to take a very different view of architecture, and do not desire to see copies or paraphrases of dead styles built, but to see architecture brought to life again; but unfortunately this has not yet been perfectly accomplished, so the task of persuasion is much more difficult. Still it is the duty of every patriotic architect to urge the importance of architecture whenever he has the chance of doing so with effect, as it is the duty of every painter and sculptor to urge the necessity of portraying on our public buildings the beauty and character of the time, the glorious epochs of our own past, as well as those of the world's past, that have favoured freedom and progress.

Architecture raises emotions, but they are vague, and thoughts that are high, but a little recondite, while the emotions produced by figure painting and sculpture are definite and more exciting, and they are urgently needed to enlighten and charm the people. The most important factor in our own hands for the advancement of architecture is the proper teaching of architectural students. In many respects the teaching they have hitherto had has been good, though in some respects it could not have been worse. With such an energy, perseverance, and enthusiasm as the architectural students have lately shown, I think if they knew the right way and the right aim, and followed them, we might again see architecture recover from the suspended animation she has suffered from so long. The profession has been greatly indebted to the Royal Academy for giving some public education to architectural students when there was none to be got elsewhere. There has always been some education given by individual practitioners. As soon as the Academy was founded in 1768 lectures on architecture were given, prizes were offered, and students were allowed to draw from the antique. The prizes were a silver medal for the best measured drawings of some Classical building in London, and a gold medal for the best design for a public building, and this was, I believe, the first attempt at public instruction; but the teaching naturally carried out the beliefs of the day, handed down from the time of the Italian Renaissance—*i.e*, that all that was necessary for architects to learn was freehand drawing, including the figure, for, according to Michelangelo, architecture was only a branch of draughtsmanship, and all beyond was the study of Vitruvius and the Roman ruins, in books at least, if the real remains at Rome could not be reached. The Academy founded a travelling studentship so that Rome might be reached. It has since started classes for the study of planning and design. It has the finest collection of casts of Classic architectural ornament in London: too little used by those who wish to be architectural draughtsmen, ornamentalists, or scene-painters. Subsequently the Royal Institute of British Architects started a voluntary examination, which was the first attempt to turn students' attention to all the studies imperatively wanted for the exercise of their profession at that day, and it has since made the passing of an examination obligatory on those who seek for enrolment in its body: this was followed by courses of instruction on the subjects at the Architectural Association's rooms. This examination and these studies have had a most wonderful effect in improving the knowledge and skill of the rising architects. The extraordinary demand for buildings with some architectural pretensions must not, however, be overlooked. If these various means of instruction and of testing the results had embraced all the subjects I consider necessary, and given the due importance to each, I should have nothing to say on the subject.

It is most unfortunate that we know nothing of the training of Greek architects, and nothing of the training at Rome, except what we find in Vitruvius, and that Crassus started schools at Rome for teaching architecture to slaves, and is said to have made a large profit out of his venture.

We know that Constantine the Great started architectural schools in Europe and north-west Africa for free youths of liberal education, and though we are ignorant of what was taught, we guess that the methods were excellent from Sta. Sophia, at Byzantium, which was built some two centuries afterwards.

We know nothing of the Saracen schools, except that their architects were called mathematicians or geometers; but till Owen Jones' day in England, and M. Bourgoins' in France, the geometrical problems of the Saracens had been unsolved. We know nothing of the Romanesque and Gothic schools of Europe, except that they existed in the Abbeys from a very early date, and that shortly after the thirteenth century, the French architects withdrew from the wing of the clergy, and formed lay guilds of their own. To this we may add the testimonies of Professor Willis and Viollet-le-Duc as to the great skill of the Gothic architects in descriptive geometry.

The Renaissance school, of early days at any rate, was the measuring of Roman ruins, and subsequently of studying the portrayal of these ruins in books, still carried on to this day, with the addition of Gothic. Whatever may have been the merits of the Roman buildings, and they were great, Roman architects had this capital fault, that their object was not to invest their own new arched construction with appropriate forms, and so create a style, but to overlay it with the post and lintel work they had abandoned in their construction.

There are certain things architects must know they must know how to construct, to plan, and to bring the whole building into some rhythmical arrangement. I want you to see all that artists,

* Being the second Royal Academy Lecture on Architecture this Session. Delivered on Thursday evening last, January 31, 1895.

as artists, can do; the musician can only express himself by music, the poet by words in rhythm, the painter by pictures, the sculptor by carved or modelled form, and the architect by building. As architects, all your learning, knowledge, and wisdom, all your skill, all your thoughts, emotions, desires and aspirations, all your taste, morals and manners can only be shown by building. It is true that at certain epochs painters were not quite sure that their portrayals would be recognised, and wrote on a scroll, "This is a lion," or what-not, and certain architects also being doubtful about the sacred character of their edifices, have had "Little Bethel" inscribed on them; but these are but mean expedients, which masters of the different arts would not resort to now. The knowledge of building is gained in two ways, by experiment and calculation, and by experience. Experience is the earliest and in most cases the simplest way, and was the method followed by the ancients and the Mediævals. Our Building Act takes the long walls at Hadrian's Villa as its datum; these long isolated walls have stood 1,757 years at least, and are sixteen times their thickness in height, so this ratio of thickness to height was taken in the Building Act for ordinary walls, though it is doubtful if any ordinary walls are equally well built now, for Professor Middleton tells us that in making the modern alterations at Rome, it was necessary to blast the rubble work. If, however, we want many walls for purposes that this wall did not meet, it is easier to learn what their proper thicknesses should be from experiment and calculation than to look up examples that fit the conditions, which could only be found after a long search, and should we even find an example, it would only show that such a thickness is not too thin, but it may be a great deal too thick. Supposing we had many walls to build that had no other force than the wind to resist, we might thin each successive wall until it blew down, and then we should know that it was too slight; but this, though it was the ancient way, is a costly way of learning, even if it involves no other consideration; for the wall in failing may destroy property, or even maim or kill people.

Statics are therefore to be learnt, and we can see what results have followed on this knowledge and that of the strength of iron and steel, by the marvellous iron structures of the engineers.

All walls above ground have to bear the pressure of wind, and some have to bear the pressure of earth or of water as well, while others have to bear loads besides their own weight and the weight of floors and a roof, as well as thrusts from arches, vaults, or domes, and the weight and thrusts of goods stowed against them.

We do not often want to know the strength of bricks in tension and in cross strain, except as corbels, but we want to know it in brickwork for fence-walls and chimney stacks, and even for walls while being built. For stone and marble, this knowledge is indispensable, and yet there are few, if any, published experiments.

It is remarkable how impervious quarry-owners and stone-merchants are to argument on this subject, but their minds would be opened if architects refused to use their goods unless furnished with exact data of their qualities. They have for at least a century past been aware of the supposed importance of knowing the crushing weight of stone, which is almost useless, for we want to know the cracking weight, as that shows when the material has been strained beyond its power of resistance. Hodgkinson started experiments on the tensile strength of stone, but was persuaded to give it up by a mason, who believed in the rule of thumb; though pendants are wholly in tension, and lintels, steps, and landings are in cross strain. Twenty years ago I wanted to use some very large granite corbels, but could not find any data as to the strength of granite in tension or cross strain, and so had to use iron, and though I pointed out this want to the largest and most intelligent of the granite merchants, he preferred saving his money to enlarging his business. Stone and marble are largely used for lintels, landings, steps, corbels, and cantilevers, but the rule of humb dies hard. I believe I was the first architect who persuaded a large marble merchant to have Sicilian marble tested for tension and cross strain. The architects of the last period of Gothic used stone pendants and pierced cantilevers plentifully; the knowledge gained by their experience was, I suppose, a trade secret, for the results of them have never been published. We also want the knowledge of cross strains for the different sorts of woods, but, except for hard foreign woods of modern introduction, there are ample data. Hodgkinson's fame rested on his elaborate and complete investigations of the strength of cast-iron in compression, tension, and cross strain, as well as on researches for the best form of cast-iron columns, stanchions, and girders. Fairbairn was, I believe, the first who tabulated these qualities in wrought iron, from the experiments made by the Chester and Holyhead Railway Company. Without these data, all the wondrous ironwork of the modern engineers could never have been carried out. Without the knowledge of the powers of stone that the Gothic architects had acquired by practice alone, their marvellous works could never have been executed, and even now the want of this knowledge prevents much originality in construction and in form that we might otherwise see.

Architects avoid the use of ornamental ironwork when it is structural, because it involves a knowledge of the material, of calculation, and statics, and yet we must look forward to its greatly superseding more time honoured materials. There are, of course, a few examples of ornamental cast-iron columns, stanchions, cantilevers, bressummers, and girders in England, and it has been used for ornamental columns and stanchions at railway stations, at the National Library, and for the girders of the entrance hall of the Fine Art School at Paris.

Besides the necessity of knowing statics and the strength of materials for safety, this knowledge does two things for us on the artistic side: it gives us some of the main proportions, some of the necessary shapes, and roughly the forms into which the strains on structural parts will allow the materials to be cut away.

Most of the architecture of that part of the world that eventually came under the Roman sway, was distinguished quite as much by an advance in construction as by æsthetic difference; with the exception of Greek, and perhaps of Saracen architecture; supposing Stonehenge to be antecedent to Greek architecture, the constructive principle was the same—it was post and lintel work, the one rude and savage, the other finished with the greatest æsthetic refinement that the world has yet seen, or is likely to see.

Roman architecture was marked by the introduction of the arch and by a continual progression towards the abolition of the lintel, until the final and complete triumph of the arch, the vault, and the dome in Byzantine days.

The Saracenic, when it got to have a very marked style of its own, was rather characterised by æsthetic change than by structural advance, by the foiling of arches, by stalactite corbels, capitals, cornices, and ceilings, and by recondite geometric patterns.

Gothic owes its distinctive character quite as much to its structural advance as to its æsthetic peculiarities. The adoption of the pointed arch gave a freedom to vaulting that it had never before enjoyed; for by means of the pointed arch any space, however irregular, could be vaulted; the discovery of the means of balancing opposing thrusts, the improvement of the buttress by sets-off and pinnacles, and the perfecting of the flying buttress, gave constructors a power never before known and never rivalled since, till the investigation of iron had placed a greater power in the hands of the engineers.

It seems doubtful if more can be known about the capabilities of stone than was found out by the Gothic architects; it seems hardly likely that supporting members can be made slimmer or screening parts slighter if any durability is wanted; and this by no means exhausts the list of the various wonderful ways in which it was used in cross strain and in tension, for you may see a pendant in the middle of a set of vaults where you would expect to see a column. Stone was pierced into lace work, it was cut into fringes, it was used as pierced cantilevers to support slabs or vaults, and it was twisted into every possible shape that stone should not be used for, particularly in flamboyant windows and window-heads, and this was not the mere piercing through of a slab, but consisted of pieces mechanically put together.

Æsthetically, however, stone might be used in shapes as slight as in Gothic, but of wholly different forms. If the taste of succeeding generations should turn towards slightness, or the parsimony of this require it, I think it is to the metals we must look for the material. The difficulty in using iron æsthetically is that from its very strength it tends to effacement, setting aside all the difficulties arising from its expansion and contraction, its condensation of damp vapour into water, its rusting, and the difficulty of making water-tight joints with it and glass, particularly when these joints are on horizontal planes.

Another drawback to the æsthetic use of structural ironwork is the prosaic reason that no one will pay the architect for designing it, as it involves four or five times as much time as similar work in the older materials. No one will pay for this extra time and skill, the architects being probably expected to live on the iron-filings, as Mark Pattison said the etymologists were expected to live on Greek roots.

It is easy to say learn geometry, mathematics, statics, and the strength of materials, but it is what few men can thoroughly acquire in that part of their life which is devoted to learning, and these sciences are wanted to be known before construction can be properly entered on. A very ready means of learning solid geometry is by practical stone-cutting, where this is carried on to a small scale with blocks of plaster, and it gives lessons in accuracy as well as in the use of tools, not to speak of its making the fingers nimble and curing clumsiness. At the Renaissance nearly all artists were apprenticed to goldsmiths; it is supposed mainly for this reason, though partly, no doubt, as giving them a handicraft to live by, if they failed as artists. Francia put to all his pictures "Francia, goldsmith."

The study of geometry, besides its other practical and mental uses, was used by the Saracens in a new æsthetic way; they doubtless picked up the original idea from the Byzantines, but they not only carried it much farther, but farther than it has ever been carried before or since, though I think that a deep study of geometry must have been one cause of the peculiar artistic development of Gothic. The Saracens found out that a few simple forms of solid geometry, when ingeniously put together, produced as marvellous effects as a few bits of coloured glass produce in a kaleidoscope, and whether from imitation or from independent discovery the Gothic architects have occasionally used the same methods.

It is the possession of so many inconsistent arts and sciences by the same man that make great architects rarer than the black swan. It cannot be said that the possession of a sentiment for form and a sentiment for colour are inconsistent with one another, or else we could hardly have painters; but in their highest development these two gifts are rarely found in the same man, even if they be joined in the same nation. The Tuscans and Umbrians were formists, the Venetians, Parmese, and Modenese colourists.

It is not a very rare case to see a good painter who is a good sculptor too, though the reverse is much rarer; but to find a geometer and mathematician with great ingenuity as well, who has taste and artistic invention, is very rare indeed. The former conjunction seem to belong to the same group of qualities, the latter to belong to opposite groups.

It would, however, be trebly foolish of the architects to abandon construction; it is his structural ability that now gives the architect a certain degree of weight and of respect among mankind, it is the very foundation of their business, and if they relinquish it they not only sink in the estimation of mankind, but ought to sink in their own estimation, for they desire to be designers instead of architects. That their designs are to be built gives them reasonableness and stability; they are not dreams, nor visions, but things which can be built, and when built will stand, and, lastly, the intimate acquaintance with the material and the office it has to fulfil will greatly determine the shape of the parts of a building, and will enable them to know where, and, to some extent, how it should be enriched by the sculptor or the painter.

Construction is not only intrinsically the most important factor in architecture, but at the present time it is imperatively necessary to be insisted on, because of the tendency to look down on it and to shirk it, and because it is partly through necessary variations in shape, on account of the qualities of the new materials, that we must look for an improvement, not only in the method of learning architecture, but in architecture itself.

I am not sure, in a certain sense, that I ought not to have put planning before construction, for what is to be built must be arranged in some fashion before it is begun; but as the art of building is the most important factor, I put it first.

Planning requires an elementary knowledge of geometry, and much ingenuity, even for the commonplace plans that every architect has to make; but besides this knowledge and this quality, planning is a transcendental art as well, for in complex or grand structures it admits of a

larger grasp of mind being shown by some architects than by others, both in disposition and in shape, and the test of this superior capacity in arrangement is, that the plans look simple, natural, and inevitable, and this may even apply to peculiar shapes, like those at Sta. Sophia.

The plan of every building should suggest to an architect not only how the building is to be constructed, but how the whole of its outside is to be arranged. There can be no question about the plan showing the construction of a building when it is to be vaulted or domed in masonry, or where masonry towers or lanterns are to be used, as the doming or vaulting has to be first arranged, and then the piers or columns that are to support it, and if the main divisions of the ground plan are not kept to in the roofs, fatal blemishes ensue. The want of this necessary consideration, and the ease with which strong girders can be used, often spoil buildings which would otherwise be excellent. The outside suggests that the plan of each story has been made separately and independently; porches and bays jut out across the lines which should mark the divisions of the structure, or across the bearing ends of the gables. French architects who visit London shrug their shoulders at such examples. I hope to devote a lecture to the subject of planning.

It is convenient in analysing architecture to separate it into its main divisions, to call the strictly necessary part of construction that does not even seek to raise emotions, building; to call the arrangement, whether it seeks to raise emotions or not, planning, and the fine art of building æsthetics, though often vulgarly called architecture. It may also save confusion if we now consider in what the æsthetic part mainly consists. It principally consists in ratios or proportions that are agreeable to the eye, just as music mainly consists in ratios of sounds that are agreeable to the ear, but in both cases with exceptions, and in both cases the foundation of these ratios is mathematical. In architecture these agreeable proportions may either be due to accident or to art—for example, we sometimes see the dead wall of a cottage with one single opening in it that is fine architecture, but it was made accidentally by the bricklayer; the owner wanted an opening in the dead wall, and the size of the opening was probably the effect of chance, the height and length of the wall were settled by the requisite lengths and heights of the rooms, the harmony was accidental, but the most supreme art could not have produced anything finer; this, of course, is a rare instance, as there are many millions of chances to one that these ratios would have been vulgar or ugly rather than beautiful. We may, therefore, discard accident as a means of success, but when we meet with such a case, we should secure the measurements for study and consideration, if not for future use. In the case mentioned, sketching would have been of no more use to an architect than to a musical composer, but sketching is generally of more use to architects, as it not only renders them "scientific observers of physical beauty," but it is the means of noting the original or striking motives they may see; while the musical composer notes the airs, tunes, and striking noises he may hear in a different way. There are, however, in the productions of architecture many other laws besides the different applications of proportion, and to this subject I hope to devote a lecture.

The next division I make is purely artificial, and consists of the analysis of the ways of producing different sorts of emotions, from delight to horror, as it really belongs to the last division; or these emotions must necessarily be produced by different ratios and by different applications of the laws, and to this subject I mean to revert.

The last division will be an attempt to show how the spirit of the age may be impressed on its architecture, if this does not evolve itself out of the former investigations; for we may perhaps come to as extraordinary a conclusion as Plato did about justice, for after hunting for it through the whole Republic, all he can find out is that it must be minding your own business.

The architect must have, too, such knowledge of sculpture and painting as will enable him to prescribe the scale and to point out the size of the masses and the tendency of the lines required, so that the two arts may enhance one another. The sculptor and painter ought to know this too, but one or both of them may not, or may think the architecture too unimportant to be considered, and treat it just as architects have sometimes treated painting and sculpture.

If sculptors, painters, and architects are to work together so that their works may form one perfect whole, it is necessary that each of them should have some elementary knowledge of the other two arts, at least enough to prevent each man's work from spoiling that of the other two, and that is why it is so valuable for the painters and sculptors to attend the architectural lectures, and for the architects to attend those on painting and sculpture. I do not suppose that any architect, sculptor, or painter would wilfully spoil the work of the other two, but they often do. Architects in designing pedestals for statues, occasionally put a cornice of such projection and with such strongly-marked detail, as to attract the eye from the statue to the pedestal. In memorial tablets with a bas-relief, the architectural details are sometimes so pronounced that the bas-relief looks like a roughened slab, while it is this part which the architecture ought to support and emphasise, as the accompaniment should the song.

If, too, the architecture is barbaric, it makes all refined sculpture and painting out of place. Though I do not care about having a solid wall turned into a panorama or a battle-scene, although that may be but a personal peculiarity; but to have a building, a hall, or a room that is of dignified proportions dwarfed by gigantic figures cannot, in my opinion, be defended.

Michelangelo has given the most signal example of this blunder, by the gigantic decoration of the ceiling at the Sistine Chapel; he has made that vast hall look like a doll's-house. It may be said it was worth destroying the Sistine Chapel to get the finest work of modern times, still Phidias did not spoil the Parthenon. When it is considered that besides the arts and sciences enumerated and those that are understood, that the architect has to be a judge of the bearing power of the ground on which his building is to stand, that he must have some judgment as to the qualities of all the materials used in a building; that he is the general of an army of excavators, bricklayers, masons, and carpenters, of slaters, tilers, plumbers, zinc-workers, and coppersmiths, of plasterers, joiners, painters and glaziers; of grate and stove makers, hot-water men, gas-fitters and electricians, bell-hangers, locksmiths and ironmongers, you may wonder how it is possible for any human being to acquire so much knowledge, and ask yourselves if twenty years' study will enable him to do so.

Sir John Soane is said to have rebuked a young architect who asked for his help to get an appointment, by saying "Do you think you are fit for the place!" The young architect retorted rather warmly, "I have been articled for seven years, so I ought to be fit." "Why, sir," said Sir John, "that is the time it takes to make a cheesemonger." I beg you all to devote yourselves to your profession exclusively, until you have mastered the necessary elements: when you have done that, every accomplishment is of indirect advantage, from jumping a five-barred gate to playing the fiddle, or to reading a Greek play in the original. Be sure, however, that you are a competent architect first; if you are not that, though you may have a smattering of every art and science in the world, you will only earn Martial's compliment to Attalus, "You are a great meddler." The advice, too, on the temple of Delphi is useful for all, "Know thyself." It is excellent to rival the great architects of the past if you can, and few of us know what we can accomplish by close application, unwearying perseverance, and wooing the art in season and out; still it is not thought wise to begin a great mansion, if your means will only allow you to finish the stables.

I recollect a man asking my father to recommend him for the Gresham Lectureship on Astronomy, and added "I am going to be an architect." My father said, "It is rather late to begin." "Oh," said he, "Sir C. Wren held this astronomical lectureship before he began to study architecture," but I never heard of this gentleman getting beyond astronomy.

Let me again recommend to each of you to know yourself, and also to bear in mind the proverb, "All men cannot do everything," and having determined for yourself that you can master architecture, keep at first to those studies only which will enable you to build soundly, without which you cannot be an architect, to plan conveniently, and to bring your building into the pale of æsthetics, so that it may be decently proportioned, and have some rhythm in it. You will not only make a decent habitation for man to live in, but will bestow on it some of that character and dignity that it behoves every civilised man to require in his dwelling, so that it cannot be mistaken for the den of a wild beast, the shelter for a tame animal, or the hut of a savage. Happily each branch of architecture is transcendental. You never need fear that you have mastered every branch of the art, or weep' like Alexander, because there are no more worlds to conquer; but when you have mastered the necessary part, there is no reason why you should not try something outside it, which may be called an accomplishment. You must have exercise and recreation for your health, but it is much better for an architect to be a poor ornamentalist, painter, or sculptor as well, than to have spent twice the time that such a smattering would have taken in learning to knock a ball into a hole with a stick in a close room.

Only, recollect this, that with a most exacting profession before you, unless you have abilities of a very rare order, you can hardly expect to be good at your profession and excel in other arts that men have devoted their whole lifetime to master. It is one of the signs of the fascination architecture once had that Brunellescho should have left his sculpture, Bramante and Baldassare Peruzzi their painting to become architects.

I hope that among the students to night there may be a genius who can rival Bacon in the width of his knowledge and the depth of his penetration. Such a man may try to rival the great geniuses of the world, Orcagna, Leon Battista Alberti, Michelangelo, or Leonardo da Vinci, in Italy, who were mathematicians, musicians, poets, painters, sculptors, and architects; Perrault, in France, and Wren, in England, are other examples of excellence in various arts. Wren was a scholar, an astronomer, a mathematician, a mechanical inventor, a demonstrator of anatomy, a physiologist, and the pioneer of hypodermic injections, a great constructor, and one of the most prolific architects that ever lived. Some of his works are beautiful, such as the spire of St. Magnus the Martyr and Bow steeple; St. Paul's is perhaps the finest example of the late Renaissance cathedrals, infinitely surpassing St. Peter's in outline and composition. All Wren's plans show a mastery of the art of planning, and some are both original and charming, and all his works have a flavour of the grand style about them. Wren, too, would have been a commanding figure in any of the many arts he learnt or dallied with, but it is the merit of the architecture of his day, that it had the power of attracting to it and absorbing so great and widely gifted a man. As soon as modern architecture can be brought to life again, we may look to its attracting some of the greatest men, for, as Aristotle affirmed, it is one of the master arts of the world.

THE ARCHITECTURAL ASSOCIATION:

ARCHITECTURAL PERSPECTIVE.

THE ordinary meeting of the Architectural Association was held on the 1st inst., in the Meeting-room of the Royal Institute of British Architects, Mr. E. W. Mountford (President) in the chair.

Mr. T. W. Aldwinckle was elected a member, and several donations to the Library were announced.

The President stated that Mr. Lewis wished a few more members for the water-colour class.

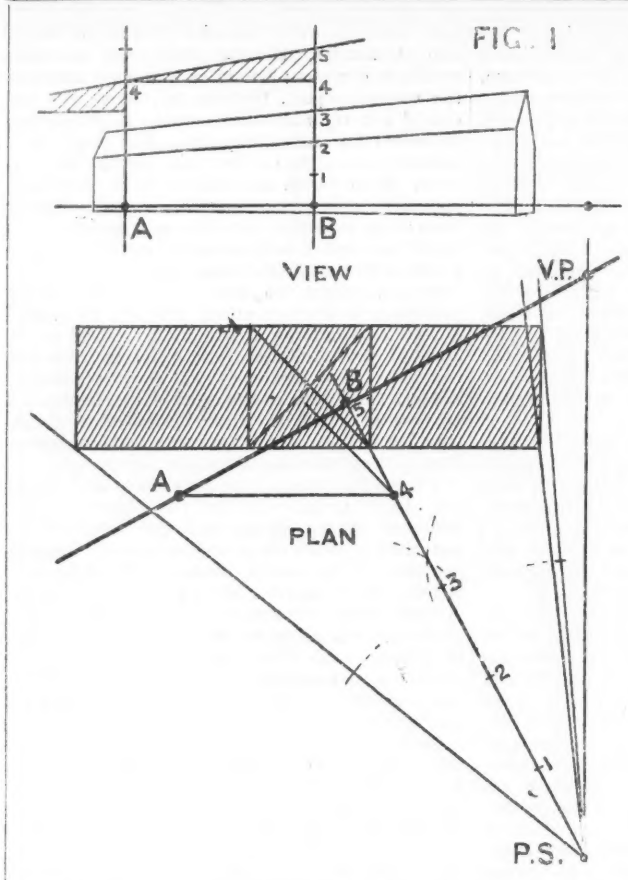
Mr. W. S. Weatherley then read the following paper on "Architectural Perspective":—

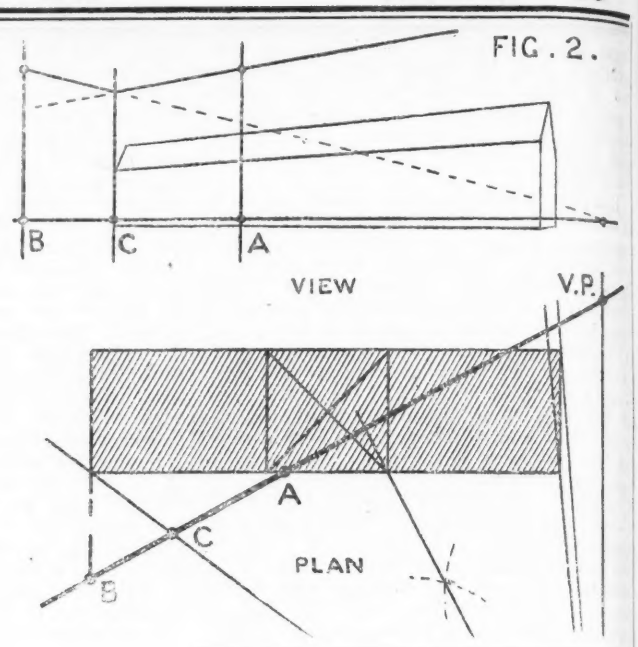
The making of an archit ectural perspective mostly presupposes the drawing of that which does not yet exist, and, one may add parenthetically, never may exist.

Thus it is that the perspective has to be worked from geometrical drawings, from plans, elevations, and sections, and I expect I have been asked to try to tell you to-night what I can about the methods I have used: the practical rather than the theoretical side of the question: at least this is the interpretation I have put upon the invitation of your Committee. I do not think I need apologise for doing so when we consider that the scientific side has so often to admit the absurdity of its results; in fact, I very much doubt whether perspective can, strictly speaking, be brought down to rules, certainly not hard-and-fast ones, for there is scarcely a rule but has to be broken, and, therefore, the best course it seems to me is to be thoroughly grounded in a few broad principles which must be used with a large proportion of that useful article known as common-sense.

The very first day of my pupilage I was set to work upon perspective, and this without any previous knowledge from books, and a very fortunate circumstance I have always considered it. I doubt much whether anybody ever learnt from books alone anything of practical use; those I have met who have tried have certainly failed.

Two books I have lately looked through, one "Modern Perspective," by Mr. W. R. Ware,





published at Boston, U.S.A., in 1883; the other, a more recent publication, I believe the very latest, and in the library of the Institute, to which I shall presently refer.

The first book is a scientific and practical work written in precise and clear language. I am bound to say it interested me greatly, for Mr. Ware was an old member of the Spring Gardens Sketch Book. It almost seems as if some of the dodges in use when I was with Sir Gilbert Scott might have originated from him. For instance, what he calls in his book the "method of diagonals" and the "method of triangles."

It may help you to understand my subsequent remarks if I just run through the terms used, more or less customary no doubt, when working from a plan.

1. *Point of Station.*—The point where the spectator stands, *i.e.*, the eye of the spectator.

2. *Visual rays.*—Rays from the point of station.

3. *Centre visual ray.*—A line from the point of station bisecting the angle formed by the two extreme "visual rays," forming, in fact, the centre line or focus of the perspective view.

4. *Point of Sight.*—The point where the "central visual ray" first cuts the building.

5. *Picture Plane.*—A line or vertical plane at right-angles to the central visual ray (used with reference to the plan).

6. *Vanishing Points.*—Points at which all lines that are in reality parallel must vanish.

As a rule vanishing points are on the horizontal line.

In what is called parallel perspective, where one side of the building is parallel to the picture plane, and therefore has no vanishing point, the vanishing points for the other sides will be found to coincide with the point of sight.

7. *Horizontal Line.*—This is always the level of the eye (used with reference to the perspective).

8. *Height Lines.*—Lines erected vertically on the horizontal line for the purpose of measuring off the heights to the same scale as the plan.

I think I can best illustrate these if I take the "point of station," "visual rays," and the "picture plane," and apply them.

For a beginner it is by far the better way, in my opinion, to determine the "point of station" on the spot, and to do this you must select a building which exists, and of which you must also have the geometrical drawings.

There will be some important feature you wish to emphasise in your view; see that this groups with the other features, and whether improved by standing rather close in or further away; then notice where your eye appears to rest, looking full to the front—the central visual ray forming as it were the focus of your view, and then imagine between yourself and the building a sheet or plane of glass—the picture plane—upon which you might trace the view at once, every line vanishing to its proper vanishing point. The distance between yourself, that is, the "point of station," and the sheet of glass is a movable feast, and only affects the size your tracing would be.

I am aware the picture plane is an artificial invention, for no doubt we view things as seen upon a surrounding transparent sphere, as if we stood in the middle of a gigantic soap-bubble. When you have these things determined and fixed in your mind, transfer them to your plan to the same scale as your plan, and you will have learnt some vital requirements which give you successful command for all that follows.

If the building does not exist, or you cannot get to it, you must go through the same operation in imagination, using the plan and other drawings, bearing in mind that from the "point of station," as far as the building is concerned, the eye can only take in an angle of about 60 deg., that is, 30 deg. either side the central visual ray, and this applies also to vertical heights with certain modifications, such as the upper part of spires, which may somewhat exceed this angle.

We know, therefore, pretty much how near we may stand in, and how far off we stand is governed somewhat by the nature of the building, whether picturesque or severe in character; standing too near brings about an acute result, too far a tame result. As a rough general rule, the distance from the nearest angle of the building is found to be about one and a half to twice the width comprised between the two visual rays that cut the extreme points of the building on the "picture plane," but there is no golden rule; it is a matter of judgment which experience alone can teach, and it can most easily be acquired by working back from an existing building, and for a beginner it enables him to identify and realise what the "point of station," "central visual ray," and "picture plane" really are when drawn on the plan.

To exemplify this, and to show how easily everything else follows—vanishing points, horizontal line, height lines, &c.—I will take a simple case, such a building, for instance, as the Cloth Hall, at Yprès, in Flanders.

This, as you know, is a building with a façade some 460 ft. long, flanked by two corner turrets, and with a central tower 230 ft. high.

Suppose we stand about 650 ft. away, determining the position and distance for the reasons already stated.

From the "point of station" draw lines or rays to the extreme points of the building, bisect this angle, the bisecting line being the "central visual ray," and then draw the "picture plane" at right-angles to it, and the point where it cuts the building will be the same scale as the plan from which you are working, necessarily so for all vertical heights at this point, and hence a height line.

Of course, the "picture plane" could be either nearer or further away from the "point of station," according to the size the drawing is intended to be.

Objects lying at the same distance as the "picture plane" are of the same scale as the plan; objects behind have their perspectives smaller, being conically projected forward upon it; and objects in front have their perspectives larger, being conically projected backward upon it.

The "picture plane" is the line upon which all perspective widths and depths are measured; the measurements being taken from just where the lines or rays drawn from the "point of station" or the eye to *any* point of the building cut the "picture plane." Whether the "picture plane" is behind the plan of the building, and the rays have to be extended—conically projected backward upon it—is immaterial, and I may remark in passing that I have found it convenient to draw the rays without reference to any points on the plan, except perhaps a few salient ones, drawing them pretty closely together, if in ink or pencil then occasionally a red one among them, and by doing so you will find the eye will readily follow any point on the plan, either up or down to the "picture plane," and then can be measured off with more accuracy than if the rays had been drawn to each particular point; and the rays need not be drawn further than you like on the "point of station" side of the "picture plane," nor beyond the limits of the plan on the other side, unless additions are likely to be made to the plan in the fore or back ground; the object being to get all your leading lines from the plan on to the "picture plane," and thus *have done* with the "point of station," and you will be very glad to do so, as it is mostly a long way off the paper, and very probably the drawing-board.

The next thing to do is to find the vanishing points, and this is simply mechanical, because, having arrived so far, they give themselves, thus—draw a line from the "point of station" parallel to the side of the building for which you want the vanishing point, until it cuts the "picture plane," and where it cuts it will be the vanishing point required, and it can be measured off, say, from the "central visual ray," and transferred to the "horizontal line"; and, if you remember that all lines in reality parallel must vanish to the same vanishing point, it will clear up any confusion that might at first arise, for you have only to repeat this operation for any side of your building at whatever angle it may be.

"Height lines" can be erected on the "horizontal line" at any point where the building cuts the "picture plane."

If the "height line" is wanted at a part where the building is beyond the "picture plane," or on the "point of station" side of it, all you have to do is to produce upon your plan any side or face of the building in the same straight line until it cuts the "picture plane," and at the point where it cuts set up your "height line," and measure your heights upon it to the same scale as your plan, working back your heights to the vanishing point for that side of your building just produced until they cut the desired parts.

It was while struggling with the difficulties of an exterior and uncertain as to "height lines," that a fellow pupil turned round on his stool and holding up about three-quarters of the length of his pencil, asked pathetically whether that was a fair height for the spire.

You will find in practice that it is best to make a height line do as much work as possible, and not employ too many; you will soon find out what is best to be done as the cases arise.

The rules which I have run through and explained by the diagrams are sufficient to enable you to make an architectural perspective, but their extended application is more intricate, and herein lies the resource and skill of the draughtsman. Before attempting to describe any of these refinements, I will just refer to the second of the two books on perspective I looked through, the one recently published. If you come across it you will know it because in every diagram the "picture plane" is drawn in no case at right-angles to the "central visual ray," the necessity for which cannot be too strongly impressed, otherwise the perspective will be distorted. I remember the street front of an otherwise fine drawing, outlined for Mr. Brewer to colour, having the appearance of looking round at one. I believe in this case the temptation was to show deeply-recessed arches, and at the same time convey the effect of great length to the façade.

Another singularity in the book is that the "picture plane" is always drawn as touching the angle of the building nearest to the "point of station, and this is taken as the height line for all the vertical heights. Neither of these cases is wrong, but the former restricts the size of the view, and fails to impart very necessary information, and the latter in practice would not simplify but lead to inaccuracy. No warning is given about an angle of 60 deg. or any other angle being all that can be included, nor a limit of how to avoid the extremities of a building becoming distorted. I think I need not mention the author's name, for you will not require to seek his book, and I have told you how to know it should it happen to fall in your way.

I have been showing how to find the vanishing points, and for those that come upon the paper or drawing-board upon which you are making your perspective you cannot do anything better or have them more conveniently to your use; but for those that come a long way off and are outside the drawing-board it is not worth while to find them at all. The vanishing points are of no value; it is the angle at which the lines vanish that is wanted, and this can be found in several ways, thus:—

Divide the distance on your plan between the "point of station" and the "picture plane" along the "central visual ray" into, say, five equal parts, and from the fourth part counting from the "point of station," produce a line parallel to the side of the building for which you require the vanishing angle until it cuts the "picture plane." Erect a vertical line A at this point, and also a vertical line B where the "central visual ray" cuts the "picture plane": both lines the same, but of any convenient height. Divide the line B, which is the "central visual ray," erected vertically, into five equal parts, being the same number as you have already divided the distance between the "point of station" and the "picture plane," and from the top of the fourth division draw a line parallel to the "horizontal line," cutting the line A. If a line be then drawn from the point at the top of the fifth division on the line B to the point where the line parallel to the "horizontal line" cuts the line A, it will form with the "horizontal line" the perspective angle required. If I complete the process through the five divisions you will see that each of the right-angled triangles is, as far as their sides are concerned, one-fifth the length of the total angle.

Or you may divide both vertical lines A and B into five equal parts, and, having done so, draw a line from the top of the fifth division on the line B until it cuts the line A at the top of the fourth division, and the same result will be obtained.

This line, if produced, cuts the "horizontal line" at the "vanishing point" for the side of the building with which we are dealing.

A centrolinead can be set to the above perspective angle—that is if you use one, I have not for very many years—or you can run the line to the edges of your paper, and form a scale on both sides; then the left or right hand one or both can be some definite scale upon which heights may be measured off.

Another way of getting at the angle for the far-vanishing point, commonly practised at Scott's, was to erect two vertical height lines on the "horizontal line" one, A being, say, where the "picture plane" cuts the side of the building, having the far-vanishing point and the other B where a line produced at right-angles to the same side from any point some way down the side cuts the "picture plane." Then we should set up equal heights on both, and run the far one B down towards the near vanishing point, which you must have already found and marked on the "horizontal line" until it cuts a vertical line C, erected over the point on the "picture plane," where the "visual ray," from the "point of station," cuts it on its way to the point from whence the line which gave the point B was produced. Having done this, draw a line from the top of the height line A to the point where the height line B cuts the vertical line C, and you will have the perspective angle given you.

A very foolish way, but gravely undertaken in my pupilage days, was to produce the "picture plane" and a line from the "point of station" parallel to the side of the building having the far-vanishing point until they met; not infrequently through a dooway from one office to another, and for this purpose we kept a huge ball of string. Then the angle was taken, the centrolinead set, and the view begun.

I recollect during my pupilage making a perspective for a competition of the exterior of a building in Mark-lane. We fixed the "point of station" some 300 ft. away, on the other side of the Lane! and the vanishing point for the front was found by the means I have just described.

The above illustrates the fact that architectural perspective is full of *alternative methods*, and he is a wise and perspectively happy man who knows the best of them.

Then there are the very useful, in fact indispensable, 45 deg. vanishing points: these are found in precisely the same way, that is, a line parallel to the 45 deg. side and drawn from the "point of station" until it cuts the "picture plane," and then transferred to the "horizontal line." The far one can be got from one of the divisions on the "central visual ray" on the principle used for the far vanishing point of the building.

For diagonals of towers, for the setting out of pavements, divisions of bays, and for the sides of octagons, &c., these points are, as I have said, indispensable.

When a 45 deg. vanishing point comes very near the "central visual ray," it is not of so much use for objects near the centre of the composition, because the angle it makes with the vertical lines is so acute.

Vanishing points for an angle of 60 deg. are obtained in the same way, and are, of course, required for hexagonal forms.

Up to the present I have been chiefly referring to exterior views, but the methods hold good in the main for interiors, bird's-eye views, and what Mr. Ware alludes to as toad's-eye views.

Interiors are frequently drawn in what is called parallel perspective, in which, if a parallelogram, then one side of the building is parallel to the "picture plane," and therefore without a vanishing point, and the vanishing points for the other sides coincide with the "point of sight." It is a mistake to let the "point of sight" be exactly in the centre, but it cannot be very much out of the centre if the view is to be kept in parallel perspective. Mr. H. W. Brewer's very fine interiors are mostly drawn in this way. Personally, I prefer using angular perspective or a judicious blend, for instance, in the near parts where the horizontal lines are obviously getting out of perspective, such as to the beams of a roof or to the pavement.

Interiors require management; you may have, for example, the abacus of the capitals on the flanking sides, as they get near you, looking as if they skewed upwards and outwards, although in reality drawn perfectly horizontally.

Or, again, you may have, at the far end, an arcade opposite you in which the columns, as taken from the "picture plane," get wider the further they extend to the right or to the left. I need scarcely say these sort of things have to be corrected to what will satisfy the eye, which you must not forget an outsider possesses and uses with critical effect.

Interiors admit of some considerable scope in the latitude and flexibility of perspective rules. Really a very beautiful drawing made to show the octagonal central hall of Sir Gilbert Scott's design for the Royal Courts of Justice is probably unique in this direction, in that it shows seven sides of the octagon! The perspective is reduced, and forms the frontispiece to the second volume of Sir Gilbert Scott's Royal Academy Lectures.

Bird's-eye views have the "horizontal line" high up, fixed according to the range of view required; they are troublesome drawings to make, and the vertical heights have a tendency to look too high. The best advice I can give you is to place yourself a long way off and a good way up.

Toad's-eye views, to quote Mr. Ware again, are luxuries, except in a mild form; they are, as their name implies, the converse of a bird's-eye view; the mild form is when a building is on rising ground some 30 ft. or so above the eye.

I remember going in for the Preston Hotel competition, the site being some 40 ft. above the surrounding grounds, which I well knew rose rather swiftly to the plateau for the hotel. I roughed out a view, putting the building 40 ft. above the horizontal line, deducting nothing for the level of the eye, and the result was as if I had placed it on a mere hillock, and before I got the appearance I knew it ought to have I had to add another 25 ft.

Every one who has gone through some such experience must be quite aware of the result. What may be the explanation I hardly know, but it is, I think, one of the many illustrations of the attempt to reduce an art to abstract rules which have been pushed too far. As a matter of fact, when we look at a building on a hill we do not keep our eyes fixed into the hill-side 5 ft. more or less above the ground we happen to be standing upon. This is, however, what the rules of perspective compel us to do. In looking at a building on a hill the "central visual ray" is really thrown up; the "picture-plane," to be at right-angles, is tilted forward, and, as a consequence, the vertical lines vanish upwards. Any one who has stood close under a hill and sketched some tallish building on the summit cannot fail to have drawn the vertical lines converging upwards.

There is something very odd about mountains and hills, for if you made a model to scale, for instance of the Snowdon range, you would find the mountains looked mere absurdities; and it is partly for this reason that engineers and surveyors adopt two scales, the larger one being used for the heights.

During my pupilage, I was lent out to Messrs. Bodley & Garner, and from them learnt to work perspectives with two scales, one scale having a twelfth added and used for all vertical heights. For interiors you will find this gives a much juster representation, which you can prove for yourselves from an existing building.

The use of diagonals is one of the simplest and most accurate ways of finding centres, or dividing up spaces either in odd or even parts, in fact they can be employed in ways without end.

It is evident the diagonals of the squares, or in other words, the 45 deg. vanishing points, can be used in working out interior views in parallel perspective, so that you may practically dispense with the plan—for instance you can make a scale across any of the horizontal lines—suppose the total width be 25 ft., and your bays are 15 ft., all you would have to do would be to divide the width into twenty-five parts, take fifteen of them, and by means of the 45 deg. vanishing points, mark this off on the perspective side, and then you have the 15 ft. bay in its perspective length. This principle admits of unlimited extension, so that for widths and depths it is quite unnecessary to consult the plan other than to know the actual dimensions.

This method is, I believe, largely taught among drawing-masters, and adopted by painters and others who will not or cannot understand a plan. I don't think an architect would take kindly to it, and it is useless with angular perspective and for exteriors.

Mr. Ware describes a method of triangles which he considers a more direct application of the same principle. It is undoubtedly more direct, and it can be used with advantage when the vanishing point of the third side of the triangle comes conveniently on the drawing-board, otherwise it is a bother, and the ordinary use of diagonals is practically less trouble. Diagonals are also absolutely necessary for putting in circles, either vertically or horizontally, or arches in perspective.

You will find the curve on the far side of the arches can for all practical purposes be struck on a line parallel with the "horizontal line," that is at right-angles to a vertical line from the perspective springing.

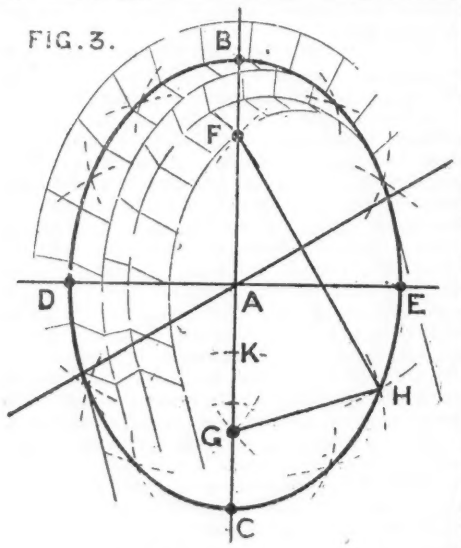
The near side is always a compound curve in drawing; it can be drawn by the hand, struck in by compasses, or by means of curves. Remember that both sides of the arch are parts of an ellipse. I am, of course, now speaking of arches composed of segments of circles. Remembering this helps the draughtsman to give the right swing,

and to know instinctively how the curves in perspective ought to look, especially for the near side, which is the difficult one.

With respect to circles in perspective, there are two aspects which do not require extraordinary skill to depict, that is when it happens to come a circle pure and simple, or a straight line, *every other* aspect is an ellipse, but this is cold comfort, for it is almost more trouble to draw an ellipse, irrespective of the difficulty of finding the perspective angle of the major and minor axes; still, it is useful to know how to draw an ellipse, because it helps, as I said before, to give you the right swing.

To draw an Ellipse.—Let B C be the major axis, and D E the minor, bisecting one another at A. From D or E, with the radius A B or A C, strike the circle F G, G F cutting the major axis at F and G (these are the foci). From G strike

FIG. 3.



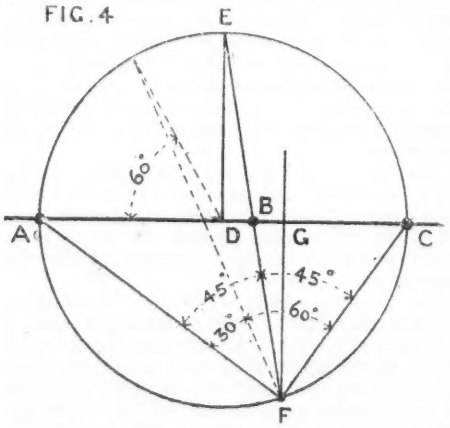
a circle with any radius less than A C, say G H; then measure off this radius on line C B, from C, at K, as shown. From the centre F, with radius equal to B K, strike a circle, cutting the other circle at H. Find any number of points such as H. F H and H G are together equal to C B.

A sphere, if drawn according to the rules of perspective, becomes an ellipse, whereas spheres under all conditions are as round as a ball.

To work out the "point of station," scale and plan of a building from a photograph or perspective is sometimes of great service. The following is the method I use:—Find three vanishing points, one being a 45 deg. vanishing point, or any known angle vanishing point.

Let A B and C be the three vanishing points. B being a 45 deg. vanishing point. Bisect A C at D, and describe the circle A E C. Make angle A D E equal 90 deg. or twice angle of 45

FIG. 4.



eg., join E B, and produce to F. Draw F G at right-angles to A C. F will be "point of station," F G the "central visual ray," and A C the picture plane.

Angle E F C equals 45 deg., E F A equals 45 deg.—Had A D E been made 60 deg., or twice 30 deg., E F C would equal 60 deg., E F A equal 30 deg.

The scale must be determined from some parts of the building the actual sizes of which one either knows or can arrive at from internal or external evidences, such as the courses of brickwork, figures in foreground, height of steps, lengths of down-spouts, and various other ways. No architectural photograph should be taken without a vertical scale against the building. English photographers are more negligent in this matter than those abroad.

It is a pity the architectural perspectives at the Royal Academy Exhibition become more and more the work of a few specialists. I admit the difficulty for an architect whose time is fully employed being able to make his own views for exhibition; it is a subject that crops up for discussion every now and then. I can bring to mind a view of the entrance tower and semicircular wing of the Midland Grand Hotel; it was on two sheets of antiquarian paper joined. I was making it just at the time of an outcry that all works submitted to the Royal Academy should be the actual work of the exhibitor, and it moved Sir Gilbert Scott to write to the President pointing out that an assistant of his had spent about a fortnight on his stomach, and asking whether such a penance was required of him. This recalls an experiment made about this time in one of the rooms at Spring Gardens, and the sight of three or four men trying to do their work with maul-stick and easel, some even perched on their stools on the desks.

I have been pleased of late years to see an increasing number of pencil perspective drawings; it is a charming medium for not too large views, and is, I find, very much appreciated by one's clients. The difficulties of reproduction, which no doubt formerly stood in the way, have been quite overcome.

The sway of the architectural colourist is a thing of the past. But twenty years ago or so, although Sir Gilbert Scott loved a pen-and-ink drawing, with detail and carving put in with almost microscopic minuteness, and although Mr. Street was astonishing everyone with his powerful common ink perspectives, still it had hardly become safe to submit a set of competition drawings without a coloured view, and Thomas Allom, who years past wielded the magic of his brush, was induced to take it up again and finish in water-colour the exterior view of Sir Gilbert's design for the Berlin Houses of Parliament. This was in 1872, and Thomas Allom must have been close upon seventy years old; in fact, he died in October of that year. I do not know whether I may venture to suggest a direction for your studies, but it has always seemed to me that Canale's views at the National Gallery, such as the Scuola di San Rocco, the Piazzetta di San Marco with the Campanile, and the Grand Canal, Venice, afford magnificent lessons. The draughtsmanship is something astonishing, and although the rules of perspective have played him false occasionally, we must remember they were done about 1750, about the time Sir William Chambers made his design now in the Diploma Gallery of the Royal Academy, which is very much out of perspective.

Perhaps I ought to briefly refer to cast shadows. All you have to do is to fix the position for the sun, and work out your shadows from it on the lines I have described, treating the sun as a "point of station," and drawing rays from it and transferring them to your view. One caution I can give you, avoid a mid-day sun in the north-east! A drawing of mine, showing the east end of a large church, was beautifully coloured by a well-known hand, with light and shade coming streaming from the north side, producing fatal results; the committee revelled in discussing the phenomenon, and as you have probably surmised, another design had to be made before the work was carried out.

I am bound to say I have no sympathy with the labour involved in working out shadows to the utmost nicety, such as we see in Academic drawings, or among French geometrical drawings. If you examine some of Mr. Norman Shaw's delightful drawings, you will find the shadows thrown from any side, or both sides, of the views. I only point this out, and must leave you to become disciples or not.

A fashion in my pupilage days was to elaborate the sky, spending a day or so on a transcript of one of old Cotman's skies; not always with success, as the remark "that clouds are generally some way off" would testify.

Nowadays a few whisps of cirrus clouds are all that is thought necessary. The fine old historical competition skies, which were considered to be half the battle, have ceased to be.

The means employed to counteract optical effects one learns possibly irrespective of perspective drawing, but a perspective to a large scale is the most certain way to make sure as to what should be done. No tower, or spire, or other isolated feature should be designed and executed from geometrical drawings alone. Think of the batter to the upper stages of a tower, of the entasis to a spire, of the projection of cornices, and how immensely important these things are.

If the designer of the Tower Bridge had made a perspective to a sufficiently large scale of one of the towers the unhappy appearance of the angle turrets, which seem to be falling outwards and the finials flying away, might have been avoided, and then there would have been two mistakes the less to add to the list of its architectural follies.

I may just say a word about "cooked views." If for instance it means the rectification of the rules of perspective, or their modification, such as working from a second point of station, which is an attempt to meet what in reality is instinctively done by the eye to get a better view of any particular part, or raising the horizontal line for foregrounds and desperate expedient reducing the scale by one half for the human beings and other animated nature; then so far, I believe, most of us are sinners, and I think the practice can be at any rate defended, but a defence is not possible in cases such as adding another bay to the nave arcade! a clumsy, and, I hope, obsolete dodge; or an extra 50 ft. in the length of the chancel so that it may be seen beyond the tower; nor to falsifying a drawing so grossly as the one recently exhibited in this room, and subsequently at the Royal Academy. I mean the Gower-street front of University College extension. It was exposed at the time it hung here, and it should then have been withdrawn.

If all architectural perspectives had a plan to a small scale in the corner, it would not only add immensely to the information given, but be a check upon a too elastic idealisation of matters of fact.

I have said scarcely anything about the draughtsmanship of architectural perspectives, nor have I submitted any drawings in explanation of my remarks with this intention. The ability shown by the rising generation is far and away beyond anything dreamt of in my scholastic days. I hope I may not have disappointed you by this omission; it would, I think, have been presumptuous in me and unprofitable for you had I done so. If, however, I have been able to give you a few practical hints, I shall feel myself amply rewarded, and shall congratulate myself upon escaping the mere repetition of an "oft-told tale."

Mr. R. Phené Spiers said that a discussion or lecture on Perspective always seemed a little more difficult than the subject when they began to work. It was the custom in French architectural drawings to use the actual shadows, and he could only account for that from the fact that the Frenchman was so accustomed to use shadows in geometrical drawing, that he considered his perspective drawing would not be complete without the same class of representation. There was no doubt that sometimes good drawings had been made with the sun coming from two directions. The lecturer had been somewhat hard on the painters. The architect had to prepare his plan and his elevation, which was not likely to happen to the painter. The whole essence of perspective was the connecting of a number of points by means of intersection. The intersection of two lines gave a point, and there were various ways of obtaining the direction of these. Architectural perspective was simple for architects, but not for painters. The architect, by putting his plan on the board, and drawing lines through the picture to the points of distance, obtained a number of intersections giving vertical lines, in a few minutes; but, in order to get the same effect, the painter had to work a long time. Therefore, a drawing which Mr. Weatherley would do in a fortnight would take a painter six months to complete. The lecturer had pointed out what he called "dodges," but these were merely the putting in practice of the principles of perspective. Mr. Spiers then gave several examples on the black-board of obtaining similar results to those attained by Mr. Weatherley, but by different means. He considered they were much indebted to the lecturer for coming forward with so elaborate a paper, and concluded by proposing a cordial vote of thanks to him.

Mr. H. W. Brewer said it seemed to him that one of the great defects in all rules of perspective was that they made people draw as if they had only one eye, instead of two. That was especially the case with interiors; in fact, he had never seen a drawing of the interior of a church which gave such a view into the aisles as would be obtained in reality. The reason was that they were drawn according to the rules of perspective, as seen by one eye, whereas the other eye should

help one to look into the aisle and see a little bit round the columns. Mr. Weatherley seemed to think that they should not always draw interiors in parallel perspective. It might be a piece of cowardice on his part, but he always avoided the two vanishing points in an interior; by them one obtained fearful distortion, especially in the vaulting. It looked bad when one got a boss which should be at the top of the arch, about two-thirds down one side. If they drew the interior of a church, as seen only by one eye, they would see it without being inside it, and would be, in fact, looking into the interior from the outside. In sketching, too, we should always do so with both eyes open. He was glad to find that the lecturer was not an implicit believer in the infallibility of the rules of perspective, and he (the speaker) would say unhesitatingly that one month's study from nature would teach more than three years' study of perspective from books. He did not say that they should not study perspective from books; they must do so if they had to set up drawings of buildings from plans; but it would be better to trust much more to experience gained by sketching from nature. He had gained a great deal of information from Mr. Weatherley, and it was very good of that gentleman to let out all his secrets in this way. He had much pleasure in seconding the vote of thanks.

Mr. A. B. Pite thought it was very good that a body of students should be brought face to face with a man like Mr. Weatherley in the midst of his work, who had been the means of imparting so much information through the illustrations of Sir Gilbert Scott's lectures. For a long time he had regarded those drawings as masterpieces of architectural illustration. Their clear and bold style would preserve to them a very high position as book illustrations of penmanship. He was inclined to think that, with all the processes and technical skill now devoted to the subject of drawing, they had not got a step beyond the point which the lecturer had attained in illustrating those lectures of fifteen years ago. He would also like to emphasise what Mr. Brewer had said about the importance of studying from nature, and the advice he would give was that all students should study model drawing before taking up architectural perspective. They would learn to picture the thing they were designing, as it existed, though, by mental habit, they designed in elevation or geometrically. If they got into the habit of designing their forms by sketching them as they would picture them to exist, they would find the designs very much more satisfying. They need not trouble about basilicas or temples; let them rather try cottage roofs, and learn to be impressionists as to the effect of their designs. With regard to the use of the two eyes, it was difficult to define how that could affect the lines of perspective, as the eyes soon made a common focus. They should learn to see the design of a building as if it existed, and put it down on paper as such. Then the elevation should be drawn, and next the section. The elevation might then be put into perspective by someone else, and the two designs should be compared, and acted upon.

Mr. Paul Waterhouse drew attention to a page in Spon's pocket-book, which he had found of great service to beginners, giving as it did the first rules of perspective.

Mr. B. F. Fletcher thought it would be well if Mr. Weatherley would publish his lecture in pamphlet form, accompanied by the illustrations. He believed there would a ready sale for it, and the young man, instead of attending lectures on the subject, would get, within a short space of time, all that he wanted. As an old Academy student he had attended lectures given by a great authority, and the one thing they seemed to impress upon him was that he would never learn how to put up a perspective drawing.

Mr. Arthur Baker, R.C.A., remarked that he had found the lessons given by Sir Gilbert Scott very useful.

Mr. Lewis said that it was essential to the man who wished to design anything that he should be able to see it by simply looking round the drawings. With regard to shadows, it required some considerable knowledge of geometry to treat them correctly; but if a man had studied buildings, and noticed how the shadows came, he could sketch them in very accurately.

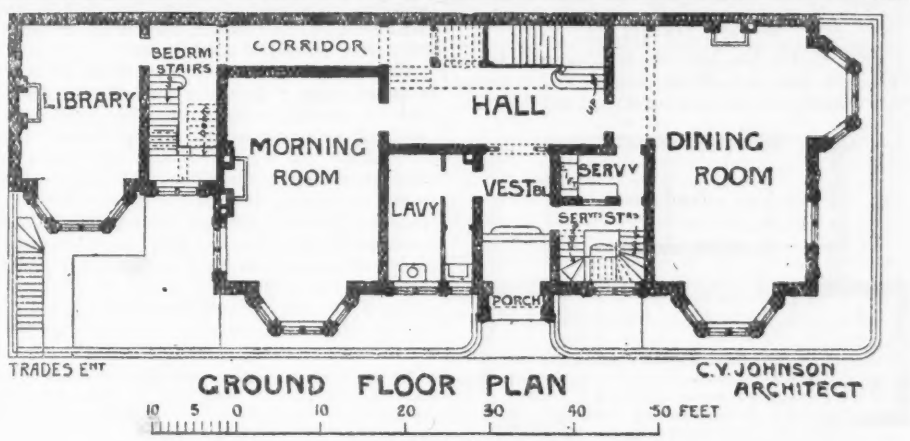
The President agreed that they had had a very admirable paper and discussion that evening. In his experience of perspective, the correct representation of a fairly lofty tower was a considerable difficulty, because if set up according to the ordinary rules, the appearance of the upper part was always misleading. It would be found that a tower which looked well in a perspective, would have to be considerably modified in execution if the same effect were to be obtained, the height having to be increased. This was because in the perspective drawing a foot in height had the same value at the top as at the bottom of a tower, while in the real building the result was very different. As regards shadows, he thought that the great charm of sketching was to have plenty of strong sunlight, for without well-defined shadows a building lost half its interest.

The vote of thanks was then put and carried by acclamation.

Mr. Weatherley, in replying, said that the processes described by Mr. Spiers accentuated what he had said, that perspective was full of alternative methods. With regard to towers, he was bound to say they were difficult to deal with in respect to the elevation. In transferring the perspective lines to the elevation an unsatisfactory result might probably be produced; in actual work it generally meant an additional height, with extra cost, unless foreseen and provided for.

The President drew attention to the paper to be read by Mr. Statham that day fortnight, which would be illustrated by lime-light views, and should prove very interesting.

The proceedings then terminated.



A Town House.

Illustrations.

PORCHES OF LONDON HOUSES.

THE porches shown in the side drawings of the sheet are from Buckingham Palace Gardens, a row of houses recently built by Mr. Willett on the Grosvenor estate of the Duke of Westminster. While the block forms one symmetrical design, individual character is given to each house by the variety in the entrance-doors and porches, instead of being recognisable, as is frequently the case, only by the numbers. The drawing in the centre shows the porch of Colonel Makins' house in Lowther Gardens, Queen's Gate.

The architect is Mr. J. J. Stevenson, and the drawings were exhibited at the last Royal Academy exhibition.

THE TITE PRIZE, ROYAL INSTITUTE OF BRITISH ARCHITECTS, 1895.

THE perspective view and plans published herewith were submitted in the late competition at the Royal Institute of British Architects. The problem was a garden pavilion overlooking a lake, containing on the water level a boat-house, and on the upper or principal floor, a saloon, vestibule, ladies' and gentlemen's retiring-rooms, and a small kitchen. A site of 2,000 sq. ft. was given, which was to include all terraces and flights of steps. The style was also dictated by the well-known rules of the Tite Prize. The plan seemed very naturally to group itself round the saloon or chief apartment as a central feature. This primary outline was square, the corners being cut off internally for passages to the ladies' retiring-room and to the kitchen, from the vestibule; the corresponding angles on the lake side, where an ample look-out is indispensable, being formed into alcoves arched over above, bringing up the whole to a regular octagon, expressed externally by a leaded dome crowned with a bronze tripod. For the purpose of convenience and isolation a small circular stair leads from the river bank to the gentlemen's lavatory, which is also reached from the end of the loggia, while a corresponding stair is used as a retired access to the kitchen, thus obviating the necessity of using the front entrance for this purpose. The whole front to the lake is devoted to an open loggia, accessory to the saloon, and forming part of a grand approach from the water side. The covered colonnaded stairs built out in the lake enclose and contrast the main portico, and by giving extension to the design obtain as much length and lowness as was possible on the restricted site. The question of the scale of the landscape and trees was then considered, and an endeavour was made to give the design an English character; the little bridge at Prior Park, Bath, by Inigo Jones, having been studied as a *motif* for the enclosing colonnades. Such a building is the adjunct of an imposing Classical mansion, such as Holkham or Prior Park, and, therefore, simplicity in general treatment was sought after, while remembering that the building had to express itself as the luxury of a rich and noble owner.

BANISTER F. FLETCHER.

*** This design was placed second and received a medal of merit. We depart from our usual rule of not publishing a "second" design in a competition unless we have published the first, because, as we have already stated, we dissent from the decision of the Institute, and consider that this design should have had the Tite prize, as being both the best idea and the best plan submitted.—ED.

A SMALL ART SCHOOL FOR A COUNTRY TOWN.

THIS design is proposed to be erected of red bricks and a local stone. In the main building there is a lecture-hall 32 ft. by 21 on the left of entrance, and two class-rooms 21 by 16 on the right. At the back is a low-pitched wing containing ladies' retiring-room 17 by 14, and small rooms for professor and model, with cloak-room, lavatory, store for easels, &c. In the basement is the heating chamber and further storage for casts, &c. The caretaker has two rooms in the attic above entrance hall. The building is economical and unpretentious, though sufficiently suggesting its purpose. It is adapted also for small public meetings, or private concerts and balls. The estimated cost is about 1,200*l*. The design was exhibited at the last Royal Academy.

E. B. LAMB.

A TOWN HOUSE.

THIS house is designed for a corner site. The arrangement of the ground floor is shown by the plan given herewith. The basement contains housekeeper's room, footmen's room, with ample cellars, and the usual offices of a house of this class. On the first floor there are three drawing-rooms and a boudoir, and on the other floors are arranged twelve bed-rooms, with dressing-rooms, bath-rooms, &c. The hall is top lighted. The elevations are designed for Ancaster stone, with green Westmoreland slates on roofs.

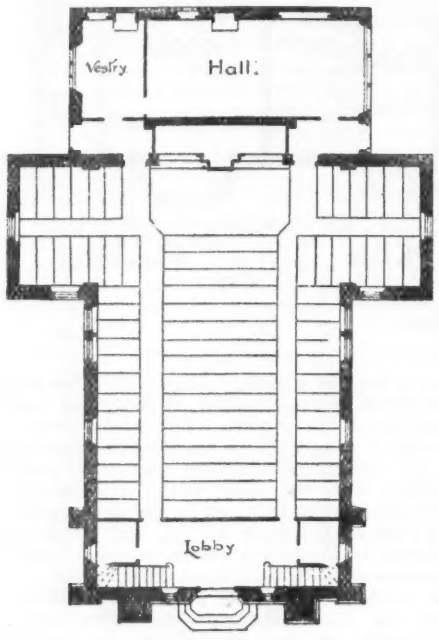
C. V. J.

INFANTS' SCHOOL, ARMADALE.

A NEW senior school for 450 children was built at Armadale, West Lothian, in 1879. The new infant school, of which we publish the illustration, is built on a site immediately adjoining, and accommodates 440 children, at an estimated cost of 2,500*l*. Mr. J. Graham Fairley, of Edinburgh is the architect.

VILLAGE CHURCH, BROXBURN, WEST LOTHIAN.

THIS church has been recently erected in the village of Broxburn, West Lothian, and is seated to accommodate 320, 282 on the ground floor and



Village Church, Broxburn—Plan.

38 in the gallery. The plan is appended. The cost was about 1,500*l.*

The architect is Mr. J. Graham Fairley, and the drawing, together with that of the church above described, was exhibited at the last Royal Academy Exhibition.

CLERKS OF WORKS' ASSOCIATION:

ANNUAL DINNER.

THE twelfth annual dinner of this Association was held in the Venetian Chamber of the Holborn Restaurant on Monday, Mr. F. C. Penrose, President of the Royal Institute of British Architects, occupying the chair. Among those present were Professor T. Roger Smith, Mr. J. M. Brydon, Mr. J. E. Drower, and Messrs. E. W. Nightingale, Stanley Clarke, T. Stirling, D. Charteris, and others.

The loyal and patriotic toasts having been proposed by the Chairman, Mr. Stanley Clarke responding for "The Army, Navy, and Reserve Forces," Mr. J. Wilkinson proposed the toast of "The Architects and Surveyors," coupled with the names of Professor Roger Smith and Mr. J. E. Drower.

Professor Smith, in the course of his reply, said both architects and clerks of works had similar duties to perform. Both alike were servants of the employer and were bound to look after his interests, and both were bound to see that fair play was given to all those engaged in the erection of a building. There was much in a building besides the solid materials—the bricks, stone, &c.: there was the labour, which was absorbed and embodied in the building, and practically there was nothing to show for that labour; but there was another contribution in every good building: an unstinted measure of thought and brain work, and there was something to show for that. Every skilled artisan engaged on the work contributed his proportion of that work, and if a particular building had anything about it that pleased or interested them it was owing to the thought and brain work which had been employed in its erection. The first duty, and the most difficult duty, of the architect was to imagine a building from nothing; but subsequently, when the building was being erected, the aid and supervision of men like clerks of works was indispensable to the architect, and where the clerk of work's supervision was characterised by intelligence, honesty, and uprightness, the result was of great value to the undertaking.

Mr. Drower responded for the surveyors, and in the course of his remarks said that by forming that association the clerks of works had shown themselves alive to the fact that the new race of clerks of works ought to have a more complete technical knowledge of all branches of their work, and he congratulated them upon what he believed was a very successful association.

The Chairman then briefly proposed the toast of the evening, "The Clerks of Works' Association." Having referred to the position and duties of a clerk of works during the erection of a building, the Chairman said that there had been times when it was difficult to obtain suitable clerks of works, but that difficulty had been removed by the action of the Clerks of Works' Association, and that in itself was an excellent reason why architects should wish every possible success to that body.

Mr. E. W. Nightingale, President, responded, and in doing so referred to some of the objects of the Association, amongst which are the following:—To find employment for such members as may be disengaged, by calling the attention of architects and employers to the advantages of obtaining competent clerks of works; to establish a circulating library of suitable works on architecture and building for the use of the members; to publish a journal devoted to the interests of the Association; that there shall be no trade unionism in any form; that there shall be nothing of the provident or benevolent character about the Association, so that no restrictions as to age, &c., need be considered in the admission of members. He hoped that the difficulty which had formerly existed, of obtaining competent clerks of works, had been removed, as he thought it had.

Mr. W. S. Woolacott then gave the toast of "The Visitors," coupled with the name of Mr. J. M Brydon, who, in response, said that this was an age of Associations, and he was glad that clerks of works had one to further their interests. But he should like them to associate for something higher than that. He was glad to hear that there was no such movement as trade-unionism in their Association. He should like to see trade unions and associations of all kinds unite to do thoroughly good work, for that, it seemed to him, was the weak point of a good many trade unions, though he hoped it was not of their Association. If their first object was to do good work, they need not fear for the prosperity of their country. No workman was worthy of the name unless he was conscientious, and it was on that conscientiousness, and the determination that between each of them they should produce the best piece of work in their power in the various trades with which they had anything to do, that the success of their work depended. It was his experience that by appealing to a man's conscientiousness much better work could be got from that man than by promising him a half-penny an hour more for his work.

Mr. J Brady, the editor of the *Journal* of the Association, proposed the toast of "The Worshipful Company of Carpenters," and in doing so referred to the work of the Company in promoting technical education and to the assistance which they had given to the Clerks of Works' Association. The toast was coupled with the name of Mr. P. J. King, who briefly replied.

Other toasts were, "The Hon. Treasurer" (Mr. J. Oldrid Scott), proposed by Mr. F. Plowman, and responded to by Mr. J. Watson; "The Press," proposed by Mr. J. Davies, and coupled with the name of our representative, who replied; and "The Chairman," proposed by Mr. R. Wheeler.

THE SANITARY INSPECTORS' ASSOCIATION:

ANNUAL DINNER.

THE twelfth annual dinner of this Association was held on Saturday last at the Holborn Restaurant, 164 members and guests sitting down together. Sir Benjamin Ward Richardson, the President of the Association, took the chair, and among the guests present were Sir J. Crichton Browne, Sir Jas. D. Linton, President Royal Institute of Painters in Water-Colours; Sir Thomas Crawford, Army Medical Department; Major-General Moberley, Professor D. E. Hughes, Dr. F. J. Allan, M.D.H. (Strand Board); Dr. Shirley Murphy, Dr. Lewis Thomas, Mr. Aubrey Richardson, Mr. H. Percy Boulnois, C.E., President Liverpool Branch. Mr. H. Thomas, Chairman of Council; Mr. Hugh Alexander, ex-Chairman; Mr. C. W. Raymond, and other members of the Council occupied the vice-chairs.

After a response to the toast of "The Army, Navy, and Reserve Forces" had been made by General Moberley, the President proposed the toast of the evening, "Success to the Sanitary Inspectors' Association." The work of the Association was passed in review by Sir Benjamin W. Richardson, who warmly congratulated the members and the members of the Council on the excellent character of the work they had accomplished, the practical nature of their objects, and the steadfastness of purpose with which they had been pursued all through the twelve years of the Association's history, and he looked forward very confidently to their still greater success in the future. There were many points in the Association's programme still to be realised, and in order to attain them it was necessary that they should be united and work together in harmony, but with good hope for the future. Greatly to his regret, their class of Officers of Health had not yet achieved the position, the importance of their work in securing the public health, entitled them to expect. He regretted, too, that a representative of the Association had not been put upon the new examining board, and that so many of them had still an uncertain tenure of their offices; but the good time was coming, and if they only held together and continued their work in the same earnest spirit which had so far characterised their proceedings they were certain to succeed.

The toast having been duly honoured, Mr. S. C. Legg, who had fulfilled the position of honorary secretary of the Association from its foundation until the end of last year, was called upon to receive an illuminated address, reciting the many obligations the Society owed to their late honorary secretary, and to accept as a testimonial a purse and a marble clock, which bore the following inscription:—"Presented by the Sanitary Inspectors' Association at their twelfth annual dinner, held at the Holborn Restaurant, February 2, 1895, to Mr. Samuel C. Legg, late Honorary Secretary, together with a purse of gold, in recognition of his self-sacrificing labours, which have resulted in the establishment of this Association in the interests of Public Health."

In subsequently responding to the toast of "Literature, Science, and Art," proposed by Sir Thomas Crawford, Professor Hughes and Sir James Linton addressed the company. Professor Hughes anticipated a great future for sanitary science. Sir James Linton traced an intimate relationship between sanitation and art. The painter might fairly be included among the sanitary reformers, for his constant endeavour was to set up healthy ideals which might lead us to view all things with healthy and sanitary minds.

To the toast of "Local Government and Education," which Mr. H. P. Boulnois proposed, Dr. Shirley Murphy was called upon to reply.

The toast of "The President," proposed by Dr. Allan, was drunk, and briefly replied to by Sir B. W. Richardson. The toasts to "The Visitors," and "The Executive," followed, which were proposed or responded to severally by the Rev. G. Martin, Mr. Aubrey Richardson, Mr. H. Thomas, Mr. E. Tidman (hon. sec.), and Mr. H. Alexander. Mr. Aubrey Richardson referred to the natural desire expressed by many members of the Association, and of some of the provincial branches for closer union, and to the schemes which had been frequently discussed. A scheme had been many times considered, and it blocked the consideration of other important questions, such as that of an examining board. He desired to see the question settled one way or the other, in order that they might pass on to more important work.

Mr. Thomas, in his reply, referred to the action taken by the executive on the proposal of the Hackney Vestry to appoint a sanitary officer at the inadequate salary of 91*l.* a year—a proposal which they hoped the Local Government Board would not confirm; and they had heard indirectly that the Board would refuse its sanction to so low a salary as 91*l.* a year for the office. He concluded with an earnest appeal to all classes of Englishmen to help an association which was striving so earnestly to fulfil the objects for which it was formed.

The hon. Secretary, Mr. E. Tidman, in the course of his response, announced that the next provincial meeting would be held at Worthing at Whitsuntide, on the invitation of the Mayor, and he hoped they would all attend.

THE ARCHITECTURAL ASSOCIATION SPRING VISITS:

NEW CHURCH HOUSE, WESTMINSTER.

THE first of the spring visits of the Architectural Association was made last Saturday to the new Church House, Dean's Yard, Westminster, when a party of nearly 100 members assembled. Sir Arthur Blomfield, the architect of the build-

ing, who was to have been present, had been summoned at the last moment to Sandringham, but very kindly sent some explanatory notes of the building, which Mr. Banister F. Fletcher, Jun. Hon. Sec., who conducted the party, read to the members. The buildings are to be erected in sections; the part now being erected consists of the great hall, below which is a ground floor and basement; these will eventually be cut up into rooms to be let as offices, but at first by the omission of partition walls, &c., two large rooms are provided on the ground floor for the meetings of the Lower House and the House of Laymen in Convocation. These they will occupy until the western side of the quadrangle can be proceeded with, and in which their permanent accommodation will be provided. The great hall abuts on Great and Little Smith-streets, and is placed on the first floor. It is approached by two staircases of ample width and well lighted, leading from an entrance vestibule entered from Great Smith-street. This staircase block is kept down, and the western gable of the hall is seen towering above it from the street.

The hall has a total internal length of 124 ft., and a width of 50 ft. 6 in. between the walls, and being provided with a gallery all round will accommodate about 2,000 people. This gallery is 12 ft. above the floor, and projects about 8 ft., by means of shaped iron cantilever girders, supported on a continuous rolled joist resting on iron stanchions placed at about 17 ft. 6 in. centres. These stanchions, of four angle-irons rivetted together, are taken up, and help to support the massive hammer-beams of the open-timbered roof, which is 62 ft. high to the ridge. This roof will be the main feature of the interior, and one bay had been specially finished, so that the members of the Architectural Association might have the opportunity of inspecting it in its finished state. The bays of the roof being wide, there are intermediate arched trusses, starting from the centre of the arches that connect the main trusses. A boarded soffit, about 6 ft. deep, concentric with these arches, runs back to the walls, spanning the large traceried window that occupies each bay. The extended stanchions referred to above are cased with oak as Gothic banded shafts, carrying the connecting arches of trusses just described. Cased iron is adopted, instead of solid timber, as might be expected, as the only way of avoiding the unsightliness, complaints, and even serious alarm caused by the shrinking and splitting of timbers, especially oak, of large scantling.

The main constructive timbers of the roof are of Stettin oak, the decorative tracery work being executed in English oak from the Peterborough district. The roof is boarded in narrow widths, laid with Willesden paper, and covered with green Whitland Abbey slates.

As a constructive novelty it may be mentioned that the roof gutters are entirely of concrete and asphalte instead of wood and lead, and Sir Arthur Blomfield mentioned in his interesting notes that he had adopted the same system elsewhere with success.

The building is erected in a phase of Late Gothic which Sir Arthur has made peculiarly his own; the exterior is faced with red Ipswich bricks and Portland stone dressings, while in the interior Ancaster stone is used. A very hearty vote of thanks was passed to Sir Arthur Blomfield for his courtesy in allowing the members to visit the building, and also to Mr. Edwin Russel, the foreman of Mr. John Thompson, of Peterborough, the contractor, who kindly answered the numerous questions put by the members.

THE LONDON COUNTY COUNCIL.

THE usual weekly meeting of the London County Council was held on Tuesday, at the County Hall, Spring Gardens, Sir John Hutton, Chairman, presiding.

Northern Approach to the Tower Bridge.—Mr. Arter brought up the report of the Improvements Committee, which contained a long paragraph in reference to the northern approach to the Tower Bridge. The committee had considered two schemes, and the one they favoured was for a street, 60 ft. wide throughout, from Tower-hill to Whitechapel High-street, by way of Mansell-street. They proposed to carry the new street from the western side of the Royal Mint (a portion of which might have to be acquired) in a direct line to Royal Mint-street at the point where Little Prescot-street entered that thoroughfare, thence passing in the line of Little Prescot-street to the junction of Mansell-street with Prescot-street, and from that point along Mansell-street to Whitechapel High-street, directly opposite to Middlesex-street, which led into Sandy's-row, now being widened by the Council to 40 ft. The rounding of the corner of Great Alie-street at its junction with Mansell-street was also included in the scheme. The northern part of Mansell-street proposed to be widened was within the jurisdiction of the City Commissioners of Sewers, who had agreed to undertake that portion of the improvement provided the Council agreed to contribute (1) one-half of the cost of the work, and (2) one-third of the cost of an improvement proposed to be carried out by the Commissioners at Upper Thames-street. The estimate of the net cost of the proposed street was, for works, 74,000*l.*; for property, 276,000*l.*; giving a total of 350,000*l.*, which included the cost of a subway along the new thoroughfare. Deducting the estimated amount to be paid by the Commissioners, the estimated cost to the Council of the scheme would be 319,175*l.* In the opinion of the Committee that was the most pressing of all the improvements which they had as yet submitted to the Council, with perhaps the one exception of the southern approach to the bridge. They recommended that powers be sought in the first Session of 1896 to enable the Council to carry out the scheme; and that part of the cost of the proposed street be met by a charge upon owners of property benefited, in accordance with the principles laid down in Clause 36 of the Council's Tower Bridge Southern Approach Bill now before Parliament.

Colonel Ford moved—

"That in the opinion of the Council the improvement recommended by the Committee is not more needed than others in different parts of London, and therefore, in the absence of new sources of income, the Council is not at present prepared to bind itself to submit the scheme to Parliament in the year 1896."

Mr. Hubbard seconded the amendment, which on a division was carried by 46 votes against 37.

Proposed Widening of Upper Thames-street.—The Improvements Committee also recommended that the Council should contribute one-third of the net cost of the widening of Upper Thames-street, as proposed by the City Commissioners of Sewers, such contribution not to exceed the sum of 12,500*l.*

The Rev. Fleming Williams moved an amendment in similar terms to that proposed by Colonel Ford in the case of the proposed Tower Bridge improvement, but the amendment was negatived, and the recommendation of the Committee was adopted.

Micro-organisms of Sewage.—The Main Drainage Committee brought up the following report in reference to this subject:—

"In accordance with the authority given by the Council on January 23, 1894, the services of Mr. J. Parry Laws and Dr. Andrewes were retained for the purpose of making investigations into the bacteriology of sewage, and their report of the result has now been laid before us. These investigations, the Council may remember, were undertaken in order to obtain corroborative evidence as to the conclusions arrived at in previous reports by Mr. Laws on the micro-organisms of sewer-air. In those reports it was shown that the bacteria of sewer air were related to and derived from those of the fresh air, and not from those of the sewage, and that there was no evidence that sewage was able directly to give up its organisms to sewer air. For greater convenience the present report is divided into two parts, the one dealing with the micro-organisms of sewage and their relation to those of sewer air, and the other containing observations on the bacillus of typhoid fever and its relation to sewage. These latter investigations confirm in a most striking manner the conclusions arrived at from the previous experiments on sewer air. If the organisms existing in sewer air were derived from those existing in sewage the bacteria of sewer air should bear a close resemblance to the bacteria of sewage. On contrasting the prevailing organisms of sewage with those of sewer air, they are found to bear no resemblance whatever to one another; indeed, so far as the authors are aware, not a single colony of any of the organisms found to predominate in sewage has so far been isolated from sewer air. Attention was also specially directed to the possible occurrence of the typhoid fever bacillus and the diphtheria bacillus in ordinary London sewage. Therefore, every colony which seemed likely to belong to either of these species was the subject of careful investigation. No evidence, however, of their occurrence in ordinary sewage was found. It is pointed out that the failure to find these organisms in ordinary sewage no doubt arises from the fact that the infected material constitutes such a minute proportion of the total bulk of sewage discharged by the sewers. The mathematical chances, therefore, of detecting these organisms are exceedingly minute unless they are capable of vigorous growth and multiplication. Realising this fact, search was made for the typhoid bacillus in sewers where it might be expected to exist in much larger proportion. On examining sewage taken from the sewer draining the fever block at the Eastern Hospital, after disinfection had been discontinued for a short period, the existence of the typhoid bacillus was satisfactorily shown—an important fact which has not hitherto been demonstrated. A series of experiments were also made to determine the fate of the typhoid bacillus in sewage, in order to verify or disprove the statement made by many writers that disease germs, such as the typhoid bacillus, find in sewage a suitable soil for their growth and multiplication. On careful investigation it has been found that the bacillus of typhoid fever is not only incapable of any growth and multiplication in sewage, but that after the first twenty-four hours it slowly and surely dies out, its ultimate death under natural conditions being a matter of a few days, or at most one or two weeks. If the organisms which exist in overwhelming numbers in sewage do not exist in sewer air, how indefinitely remote is the possibility of the existence of the typhoid fever bacillus in the air of the sewers. Sewage is without doubt a common medium for the dissemination of typhoid fever; sewage-polluted soil may give up germs to the subsoil air; but from the results of these investigations it appears in the highest degree unlikely that the air of the sewers should play any part in the conveyance of typhoid fever."

Repairing and Painting Railings.—The Parks Committee reported that—

"The Council on July 24 last authorised the expenditure of a sum of 150*l.* for repairing and painting 1,752 yards of the railings at the Chelsea Embankment Gardens and Pimlico shrubberies. The specification and estimate were in due course forwarded to the Works Committee, but that Committee having reported that they were not satisfied with the sufficiency of the estimate, tenders were invited by advertisement, and the following were received—Charles Curd, 90*l.*; G. W. Stewart & Co., 120*l.* 18s.; L. Faulkner & Sons, 141*l.* 8s.; H. Ware, 145*l.* 7s. 6d.; Vigor & Co., 148*l.* 10s.; G. Searle, 152*l.*; A. Wallis, 159*l.*; J. Garrett & Son, 162*l.* 10s. 4d.; W. Dudley, 173*l.*; R. Harding & Son, 176*l.*; P. V. Windebank & Co., 179*l.*; F. W. Harris, 179*l.*; W. G. Dickson & Co., Lim., 189*l.* 15s.; H. Munn, 204*l.*; W. Marks, 207*l.* 10s.; J. J. Rayment & Son, 229*l.*; C. Rhodes, 236*l.*; C. Godbolt, 247*l.* 11s.; J. H. Cross, 249*l.* 10s.; G. G. Wade, 460*l.* Inquiries having been made, and the result being satisfactory, we recommend—

'That the Council do accept the tender of Mr. C. Curd to execute specified works of repair and painting to the railings of the Chelsea Embankment Gardens and Pimlico shrubberies for the sum of 90*l.*; and that the solicitor do prepare the necessary contract.'"

Mr. J. Burns, M.P., said he hoped that the work would not be given to Mr. Curd, as it was impossible for him to do the work properly and pay fair wages unless he lost a considerable sum by the contract. The architect's estimate was 150*l.*, so that it could not be done for 90*l.*

Alderman Taylor moved to refer the report back to the committee with instructions to do the work themselves.

The Hon. R. Grosvenor seconded, and the amendment was agreed to.

The Architect on Contractors' Work.—The same Committee reported as follows:—

"Some remarks having been made to the Counc as to the manner in which the work of erecting the refreshment-house at Parliament Hill has been done, we thought it well to direct the architect to report to us upon the subject. We now present that officer's report.—'The Committee is, in this case, asking me to report upon a building before its final completion, for there yet remain several weeks during which the contractor is liable to make good any defects that may be found in the building, and it is quite possible that in this case, as in all others, defects may arise which have not hitherto been discovered. I must ask the Committee, therefore, not to take this report as final and binding on me. The work in general is quite equal to that contemplated in framing the contract, and compares favourably with work that has been done in the Council's parks. There are, however, three places in which, during the autumn rains, wet got into the roof. I apprehend no difficulty in discovering the places where the wet came in and in putting the tiling and the turret right at these spots. There is a defect in the brick string round the building, and there is a place where a small piece of tiling ought to have been used, but where cement was used instead. The contractor has already got these matters in hand, but the weather for some weeks past has not been favourable. I have reason to believe this reference has been made at this particular time in consequence of certain statements which were made in the Council Chamber on November 23, 1894. I do not find the statements anywhere reported, but I believe they were to the following effect:—1. That zinc had been improperly substituted for lead.—There is no foundation for this

statement. Zinc was substituted for lead by my direction, because I found that where lead had been recently used in such exposed places, thieves had got access by means of ladders and had stolen it. The zinc will last for a considerable number of years; and the difference between its cost and that of lead had been deducted from the contractor's account before this statement was made in the Council Chamber. 2. It was stated that there were seventeen broken hip-tiles upon the roof, but as a matter of fact there is not one broken hip-tile. I can only assume that the mistake has arisen from the necessity for cutting several of the hip-tiles in order to make them fit the slope and angle of the hips. Underneath those tiles which have been cut proper soakers have been put, so that no wet can get into the roof by this means. 3. Something was said about broken tiles upon the roof.—These tiles were broken by footballs, and the proper remedy will be to keep the football players at a somewhat greater distance from the refreshment house. 4. It was said that you could rub off the rough casting, with the hand.—That can be done with the best rough casting, for a few pebbles are always rather loose when the work is freshly done.—THOS. BLASHILL.'"

After transacting other business, the Council adjourned.

ARCHITECTURAL SOCIETIES.

MANCHESTER SOCIETY OF ARCHITECTS.—"Combined Warming and Ventilating" was the subject of a lecture delivered by Mr. J. D. Sutcliffe before the Manchester Society of Architects on the 5th inst. The lecturer contended that the warming effect of an open fire upon a room is not obtained direct from the rays of heat, but from their reflection from the various material objects into which they come into contact, otherwise that the sole effect of the fire is to draw cold air into the room, especially along the floor. Much more warmth was derived by direct radiation from common stones, pipes and coils, but in all of these cases there was no ventilation, the same air being breathed and warmed over and over again. Indirect radiation he described as obtained by the passing of air over heated surfaces, and thence into the room, always securing some ventilation as well as warmth. This combined warming and ventilation when provision is made for supplying fresh air and simultaneously discharging vitiated air. He instanced the American system of Messrs. Smead. According to the lecturer, that system does not admit of proper provision for filtering the air where the conditions of the atmosphere render that necessary. The Plenum system, he said, is the best for large buildings, and is always associated with mechanical force, and admits of any filtering arrangements. A fan draws in external air through a filter, and at the same time propels it through heating apparatus, whence the filtered and warmed air is driven into main and branch ducts that terminate in the rooms to be warmed. Entering above the heads of the occupants, the warm air necessarily rises at once to the ceiling, where it spreads, cools, and consequently descends, eventually passing out at the floor level by exit-ducts there provided. Dusty and other vitiated air is thus prevented from rising, and the weight of the respired carbonic acid gas accompanies and aids the descent. Experience proves that the warmth so derived is agreeable and equable, and the system prevents inward draughts or the entry of any contaminated atmosphere from outside, such entry being often experienced where mechanical force is applied solely for drawing foul air out. The system provides for entirely renewing the air of the room at any desired rate up to ten times an hour. It has been theoretically inferred that air, when treated as described, must be unhealthily dry, but repeated tests prove the presence of ample moisture. A hearty vote of thanks was passed to Mr. Sutcliffe for his lecture.

ARCHITECTURAL SECTION OF THE GLASGOW PHILOSOPHICAL SOCIETY.—A meeting of the Architectural Section of the Glasgow Philosophical Society was held on the 4th inst. Mr. Paton, Curator of the Corporation Galleries, delivered an address on "Mosaics." At the conclusion of the lecture a vote of thanks was awarded to Mr. Paton, on the motion of Mr. T. L. Watson, President of the Section, who presided.

GLASGOW ARCHITECTURAL ASSOCIATION.—At the general monthly meeting held in the Rooms, 114, West Campbell-street, on Tuesday evening, the Vice-President, Mr. Wm. Tait Conner, in the chair, Mr. R. N. Horn read a paper on "The Development of School Planning." The author traced the development of the school plan from the earliest type, which consisted usually of one large room in which both sexes were taught together by one master. At that time the education was of the most superficial kind, and no attention was paid to the health and comfort of the children. The different kinds of school built after the passing of the Education Act, culminating in the modern Board school, were described at some length. The second part of the essay was devoted to a description of the various requirements of a present-day school—the principal feature of which was the large central hall. The arrangement of the various class-rooms was considered in detail. The important question of heating and ventilation was finally discussed, and the advantages and disadvantages of ventilation by the extraction and plenum systems were explained. The lecturer was inclined to favour ventilation by extraction, and described the scheme of ventilation adopted at one of the schools built by the Govan School Board.

NORTHERN ARCHITECTURAL ASSOCIATION.—The Students' Sketching Club in connexion with this Association held their fifth annual Social Gathering in the Grand Assembly Rooms, Newcastle-on-Tyne on Tuesday last. Upwards of 100 members and friends assembled to view the students' work executed during the past season.

PLYMOUTH SCHOOL OF ART.—Mr. B. Priestley Shires, A.R.I.B.A., in continuation of the series of lectures on "Architectural History," before the junior members of the architectural profession of the Three Towns, at the Plymouth School of Art, Princess-square, delivered the eleventh lecture on the 31st ult. Mr. Shires, in his opening remarks, mentioned the causes which led to the development of the Romanesque styles in the tenth century, and said in the eleventh century each country struck out a style of its own, Germany retaining more of the older characteristics than either France or England. As long as the unbroken horizontal lines continued in use, so long may English-Norman work or the Anglo-Romanesque style of architecture be classed as purely Romanesque; but when vertical shafts were introduced running up in front of the piers in ecclesiastical buildings, and dividing the triforium and clearstory into compartments, then the first principle of Gothic architecture began to manifest itself, and, coupled with the use of the pointed arch, many new features were developed. Without going into any of the many theories as to the origin of the pointed arch, Mr. Shires thought it was by far the best plan to consider the pointed arch in the same light as nearly all other architectural features as a development. The Gothic period practically began with the thirteenth century and closed with the fifteenth century, as far as good Gothic architecture is concerned. The term Gothic was first used more as a term of reproach than for any other reason, and intended to distinguish those buildings which were considered barbarous in style, that is, those which were not Classic. During those centuries it prevailed more or less throughout the western, middle, and southern parts of Europe, and though there are some variations in the buildings of the different nations who adopted it, still as a whole they are practically one style.

ENGINEERING SOCIETIES.

SOCIETY OF ENGINEERS.—The first ordinary meeting of the Society of Engineers for the present year was held on the 4th inst. at the Westminster Palace Hotel, Westminster. Mr. George A. Goodwin, the President for 1894, occupied the chair, and presented the premiums awarded for papers read during that year, viz.:—The President's Gold Medal to Mr. T. W. Baker, for his paper on the "Utilisation of Town Refuse for Generating Steam." The "Bessemer Premium" to Mr. Ed. C. de Segundo, for his paper on "Power Distribution by Electricity, Water, and Gas." The "Rawlinson Premium" to Mr. R. Nelson Boyd, for his paper on "A Deep Boring near Friestadt, Austria, by the Canadian System," and a "Society's Premium" to Mr. H. B. Ransom, for his paper on "The Principles and Practice of Hydro-Extraction." Mr. Goodwin introduced the President for the present year, Mr. Wm. George Peirce, to the meeting, and retired from the chair, receiving a hearty and unanimous vote of thanks for his services during the past year. After some preliminary remarks, the President gave some particulars of the Blackwall tunnel now in course of construction. This important public work is being constructed by a combination of methods which unite the use of the shield, cast-iron segments, and compressed air. It will consist of 3,083 ft. of cast-iron lining; 1,382 ft. of cut-and-cover in brickwork and concrete, and 1,735 ft. of open approaches, giving a total length of 6,200 ft. from entrance to entrance. Up to January 2 last, 722 ft. 6 in. of tunnel under the river had been completed. The President then went on to deal with the question of water supply. Referring to the water famine at Leicester, he observed that the water storage there was too limited for the growing requirements of the town, and an additional storage reservoir was in course of construction. As a matter of fact, water engineers generally must look to meeting future requirements, so as to avoid possible water famines in our great and growing towns. That was now being done in the Metropolis, where the daily water consumption in 1891 was 182,456,905 gallons. According to the report of the Royal Commission which had just completed its labours, the estimated daily consumption in 1931 would be 294,000,000 gallons. To meet the growing requirements, the metropolitan water companies are constantly increasing their sources of supply, Those taking the bulk of their water from the Thames and Lea are opening up the gravel beds overlying the London clay. Others have been sinking wells and driving adits in the chalk, and the President stated that the various operations were, as a rule, giving satisfactory results, so that as far as the Metropolis is concerned, there would appear to be no fear of a water famine, at any rate for some time to come. The President concluded his address by a reference to technical education, which he said was of no practical value to the young engineer unless it was combined with knowledge gained in the daily round of the factory and workshops, shoulder to shoulder with workmen.

THE INSTITUTION OF JUNIOR ENGINEERS.—On the 2nd inst. a party of the members of this Institution were enabled, by the courtesy of Messrs. Maudslay, Sons & Field, to visit that company's marine engineering works at Lambeth. They were conducted through all the various shops of the extensive establishment. At the conclusion of the inspection, Mr. W. J. Tennant, past-chairman of the Institution, expressed the members' acknowledgments for the preparations which had been made for their reception.

INSTITUTION OF CIVIL ENGINEERS.—At the ordinary meeting of this Institution, on the 5th inst., Sir Douglas Fox, Vice-President, in the chair, the paper read was on "The Mechanical and Electrical Regulation of Steam-Engines," by Mr. John Richardson, M.Inst.C.E., of Lincoln.

SURVEYORSHIPS.

SHOREDITCH, LONDON.—Mr. T. Ridyard Roscoe has been appointed Surveyor and Engineer to the Vestry of the Parish of St. Leonard, Shoreditch, London, E.C., at a commencing salary of 300*l.* per annum. He obtained eighty-one votes as compared with nine votes given to his nearest competitor.

ECCLESIASTICAL SURVEYORSHIP.—Mr. Arthur Blomfield Jackson, A.R.I.B.A., has been appointed a Surveyor under the Ecclesiastical Dilapidations Act to the Diocese of St. Albans.

FINEDON.—We learn that Mr. Abraham Mosley, of Northampton, has been appointed Surveyor to the Finedon Urban District Council.

Correspondence.

To the Editor of THE BUILDER.

DURHAM CATHEDRAL.

SIR,—In my letter of last week, please correct an error as to where my lecture is to be found. It is in *The Ecclesiologist*, chapter 20, page 76.

Mr. C. Hodgson Fowler, architect, of Durham, who is conducting the excavations at the east end, gives me some information which may be interesting.

The dressed ashlar which Canon Greenwell came upon after Mr. Fowler had commenced the excavations, appears to be nothing but a portion of the Early English wall, and therefore of the date of the Chapel of the Nine Altars.

Several mistakes occur in the otherwise excellent article which appeared in the *Times* a few days ago. One, that the apse walls were "12 ft." thick. Another as to depth. A wall has been reached 11 ft. from the level of the present floor of the Nine Altars Chapel, and not "20 ft." as there stated.

Mr. Fowler will probably read what cannot fail to be a very interesting paper on the subject of the eastern termination of Durham Cathedral, before the Society of Antiquaries, so soon as his researches enable him to provide an ascertained plan.

E. R. ROBSON.

DISTRICT COUNCILS AND NEW BUILDINGS.

SIR,—"A Town Surveyor," whose letter is published in your issue of the 2nd inst, does not appear to have seen the correspondence in the *Times* to which the correspondence in your columns has been supplemental.

It is common ground between Mr. Jackson and myself that the addition which has given rise to the discussion is an addition to a building erected long before the existence of by-laws. This being so, I am glad to see that "A Town Surveyor" agrees with me on the main point at issue, since he says, "If perchance the main building was erected prior to the adoption of the building by-laws the regulations as to the reservation of the open space will not apply," and he proceeds to quote a case which I had already quoted in the *Times*.

Unfortunately, "A Town Surveyor," in the earlier part of his letter, has jumped to the conclusion that the main building was erected under the by-laws, and on this mistaken assumption he charges the District Council with "remarkable eccentricity." Even if he has not seen the former correspondence, he has seen (for he quotes) a passage in Mr. Jackson's last letter, referring to the main building as an "old" building—an expression which surely ought to have enlightened him. But "A Town Surveyor" is evidently a cynic, predisposed to assume perversity in Local Authorities!

As regards the Wimbledon by-laws, they are based upon the Model By-laws of the Local Government Board, and of course contain the clause quoted by "A Town Surveyor," prohibiting any future encroachment upon the space which they require to be left about *new* buildings. This clause Mr. Jackson in one of his letters strangely overlooked.

I agree with "A Town Surveyor" and Mr. Jackson in thinking it desirable that District Councils should have control over additions to old buildings, but the present state of the law is not due to a mere blunder or oversight. It should be borne in mind that in rural districts there is at present no control over buildings at all, except where urban powers have been conferred by order of the Local Government Board. We thus have (*a*) rural districts where there is no control over buildings; (*b*) urban districts where there is control over new buildings; (*c*) London and some other large towns where there is control over new buildings and also over additions to old buildings. So that the law is not without a certain symmetry, and the principle is intelligible, if unsatisfactory, to what, for want of a better word, I may call "progressive" ideas.

I do not follow the remarks that have been made as to the Council receiving and approving of plans of additions to old buildings. I think the practice is useful, and is not open to any substantial objection so long as the Council does not exercise any unjustifiable pressure. But whether right or wrong, it cannot affect the law on the subject, which is all that I care to discuss.

Mr. Jackson is incorrect in supposing that any fee is payable on the approval of plans by the Council.

I would revert for a moment to Mr. Jackson's original contention that every substantial addition—at any rate every addition covering new ground—is a new building. The world "building" has two meanings. First, "the *act* of constructing," and second, "the *edifice* constructed" (*vide* "Imperial Dictionary"). It will hardly be contested that the by-laws use the word in the latter sense only, though I fancy some confusion has arisen on account of the two meanings. In order to clear away this confusion let us take a word that has not this double meaning. Take the word "church." If an addition to an old church is constructed, in the shape of a chancel or an aisle, would Mr. Jackson say that the addition was a new church? I think not.

Lastly, I submit that residents in a locality are not so much at the mercy of the Local Authority as Mr. Jackson and some others seem to suppose. By-laws, when validly made, are just as much part of the law of the locality as if they were in an Act of Parliament. They are penal in their nature and, therefore, technically form part of the criminal law. As a rule, anyone can put the criminal law into motion, and I know of no reason why a private individual should not take out a summons against a builder under the by-laws if he is dissatisfied with the inaction of the Local Authority.

"THE CLERK TO THE DISTRICT COUNCIL OF WIMBLEDON."

February 4, 1895.

LONDON BUILDING ACT, 1894: BEDFORD COURT MANSIONS CASE.

SIR,—As I was present at the hearing of this case at Bow-street, I hope I may be allowed space to make a few remarks. Your report is to a certain extent misleading.

It is the second point of contention to which I specially refer—viz., whether the building in question was a building "to be carried out under any contract entered into before the passing of the Act"—*i.e.*, August 25, 1894. Mr. Freeman argued that a "building agreement" was not a contract intended by Sec. 212, but that only a contract between the building owner and the builder to erect a building was intended. Mr. Avory did not contend that in all cases a building agreement was a contract within the meaning of the section—indeed, he admitted that a building agreement to erect a certain number of houses of a certain class on an estate would not come within the exemption; but he contended that in this case he had made out a definite contract to erect a particular building. The building agreement was entered into in 1890, and the plans were actually approved shortly afterwards, years before the passing of the Act (this fact, although important is omitted from your report), and the magistrate's decision was that in this case such a contract had been made out.

The result of this decision is, that in order for a building owner to be allowed to erect a building under the old Acts, he must show a definite contract to carry out a particular building; a mere building agreement will not of itself be sufficient; and, in order to make it so, the building owner must show that it became a definite contract before the passing of the Act by the approval of the plans by the lessor, or that the building was in some other way particularly described. BERNARD DICKSEE.

THE LEGAL POSITION OF ARCHITECTS IN RELATION TO CERTIFICATES AND AWARDS.

SIR,—I have read with great interest this paper and discussion of last Monday's meeting at the Royal Institute of British Architects, but without finding definite answers to certain questions upon which I am at present peculiarly in want of authoritative information, and I shall be much obliged if you or any of your readers will kindly let me know as follows:—

1. Whether Clause No. 8 in the heads of conditions of builders' contracts sanctioned by the Royal Institute of British Architects is one usually retained?

2. If retained, whether and in what way it is binding upon the employer?

3. Why there is no reference to "materials brought and left upon the ground" in Clause No. 17 (the payment clause)? and

4. Whether (and this is the important point) when an architect gives certificates under "Conditions of Contract" embracing both Clauses Nos. 8 and 17, it is his duty to make fair valuation of the "works executed and materials supplied," or to satisfy his employer by certifying amounts for "works executed" only (under Clause No. 17)?

"A YOUNG PRACTITIONER."

The Student's Column.

BRICKS AND TERRA-COTTA.—VI.

COMPOSITION OF BRICK-EARTHS (*continued*).

WE are now in a position to more carefully examine the grosser particles, from a mineralogical point of view, under the microscope. If the clay has been derived directly from granitic rocks we shall find that these particles principally consist of grains of quartz, and in some cases of perfect crystals of that mineral also. In addition, there will be a fair proportion of fragments of felspar, and a little iron and mica. Quartz is not a difficult mineral to determine: it is usually of a glassy appearance, quite transparent, whilst its crystalline form is that of a hexagonal prism surmounted by hexagonal pyramids. In thin sections under the microscope it polarises in beautifully clear and brilliant colours. The fragments of felspar, when highly decomposed, as they frequently are in clays, are not so easily determinable. As a rule they are much kaolinised and quite dusky and opaque in thin sections. Their precise nature, however, may sometimes be ascertained in such pieces as present an undecomposed nucleus. The mica is determined with facility; in hand specimens it is seen as bright glittering plates, mostly black or silvery brown, whilst under the microscope it is strongly dichroic, having regular systems of parallel lines (except when accidentally cut along the planes of cleavage), and frayed-out at the edges.

When the clay we are examining is not derived directly from the disintegration of granitic rocks a variety of other minerals put in an appearance, and the precise kinds and quantities of these must depend entirely on local circumstances. We may, however, briefly allude to some of the more salient of them, especially as they are more or less present in all clays used for brickmaking, and materially influence the effect of firing.

Rutile occurs in very many brick-earths. It is generally invisible until the microscope is used, when it appears as hard chocolate-coloured or black specks. In thin sections it is mostly granular in form, or sub-angularly prismatic whilst it is slightly dichroic and is often deep-red in tint.

Zircon is not so common in brick-earths; it exists as rather hard grains, or little prismatic, crystals, often abraded. It has an extremely high refractive index, which causes the particles mounted on our slides to stand out clearly from amongst those of other minerals, and to have dark borders. In thin sections the surface is very much pitted. Like rutile, it is infusible under the blast of the blowpipe.

Hornblende and *Augite* occur locally; for a brief description of these, the student is referred to our former observations.*

Schorl, the black variety of *tourmaline*, is frequently found in brick-earths in the vicinity of granitic rocks. It may be in small, sub-angular, crystalline grains, or as a deep brown decomposition product; in thin sections it is occasionally seen as acicular radial aggregates, though not so characteristically as when it has formed in or interpenetrates quartz, or other similar minerals.

Glauconite is a green mineral, or rather a general name for greenish mineral substances of variable composition, but mostly silicates. It occurs in the interior of the tests of minute forms of life in certain seas, and from its appearance in some sands it seems tolerably clear that much glauconite, if not all of it, owes its origin to the same causes as that in process of formation at the present day. In clays and brick-earths we rarely find it as casts of these tests, as it has suffered much attrition and is chiefly reduced to mere sand-grains, all traces of its former outline having been removed.

Selenite, a form of gypsum, is sufficiently abundant in many clays to materially affect their ultimate composition when prepared as brick-earths. It commonly occurs as large and beautifully symmetrical crystals, which are known by labourers in brickyards as "lozenges." Typically it is white and quite transparent. Smaller fragments under the microscope may be recognised by their peculiar sheen and rather bright polarisation colours.

Iron exists in practically all clays and brick-earths, in one form or another. At surface exposures it imparts the brown appearance to them, whilst at greater depths, or in clays that have not been much affected by the weather, it is chiefly of a dark blue tint. *Magnetite* is often present as minute grains, which may be withdrawn from the clay sample when powdered ready for examination, by inserting a bar magnet. Other oxides of iron, such as limonite and hæmatite, occur sometimes as small particles, but the former chiefly as staining the kaolin constituent and covering other grains of mineral matter with a thin film. The presence of iron, and the state of the mineral in earths, are such important factors in considering the quality of fire-clays and the like, that these points must be rigorously investigated. Owing to the circumstance that nearly all forms of iron are opaque in thin sections, and that they do not present characters sufficiently distinct to enable us to determine them in reflected light (when existing in such minute and weather-beaten particles), we must have recourse to chemistry to assist us in this particular instance.

Iron pyrites exist in both large and small pieces in very many brick-earths. When large enough to be examined with the naked eye, the fragments are generally black or dark brown exteriorly, and exhibit an ornate radial structure of a brassy lustre interiorly. *Marcasite*, a similar mineral, is not uncommon.

The above list exhausts practically all the common minerals found in ordinary brick-earths; but, in addition to these, organic fragments and concretions are sometimes so abundant as to affect the composition of the whole. Dealing first with concretions, we may say that they fall into two categories, according as they are septaria, or phosphatic nodules. The latter do not concern us much, as they are generally large enough to be treated as pebbles, and are discarded in the preparation of earths for good bricks. The former are even larger, but may frequently be broken up and incorporated with the brick-earths in process of manufacture, especially where these latter are almost devoid of lime, though this is not often done. Iron pyrites is in a certain sense concretionary. Of the organic remains we slightly alluded to them in the last article; they consist either of the fragments or whole tests of fossils, easily recognisable as such under the microscope, of pieces of fossil wood, and in some cases of the bones of animals. As a matter of interest to the London student we may say that the bones of extinct elephants, rhinoceroses, oxen, musk-sheep, and many other large mammals, presenting a peculiar admixture of arctic with

* The *Builder*, March 17, 1894, p. 220.

tropical forms of life (if regarded in the light of the geographical distribution of their modern representatives), all of which lived in the Thames valley at a remote period, may very frequently be met with in the brick-earths of Grays, South Essex, Erith, Crayford, &c. Remains of the same animals are found also in the brick-earths of many other river valleys in England.

We come now to consider briefly the nature of the pebbles so common in nearly all valley brick-earths and in certain other superficial deposits used in brickmaking. These for the most part are hard stones which are removed in preparing the clays for all but the worst quality of bricks. It might be thought, therefore, that they were barely worthy of mention, but such is not the case. If all of them were hard and insoluble, and thus easily removed without affecting the character of the other ingredients of the earths, there would be little difficulty. But in many districts, especially in the boulder clays of the Eastern Counties, in addition to pebbles of flint, quartz, &c., there are frequently present considerable proportions of chalk pebbles which are more or less rotten now, and are easily broken up in the levigating process to the size of peas and small shot, whilst they are soluble in acidulated waters such as are commonly used in preparing the earths. We shall see later on that although a small proportion of lime does not matter (except for specific purposes)—is indeed a desirable constituent of brick-earths—that an excess of this entirely spoils the bricks. When the carbonate of lime exists as small soft pellets which become incorporated with the earths, it ruins the material for brickmaking, as during the burning the pellets become calcined and "blow off." If the pellets are impregnated with iron they simulate the remaining ingredients in appearance, and are then specially deceptive.

Chemical Composition of Minerals found in Brick-earths.

By way of introduction to the chemical constitution of the various earths employed in brickmaking, we may closely examine that of the minerals of which these earths are made, otherwise the chemical properties of the whole may not be properly understood. The following table and its supplementary remarks describe the chemical composition of all the minerals concerned, and which were alluded to either in the last article, or in this :—

		Silica.	Alumina.	Potash.	Soda.	Lime.	Magnesia.	Iron.	Sulphur.	Zirconia.	Boric Acid.	Water.
Quartz		100·0	—	—	—	—	—	—	—	—	—	—
Felspar	Orthoclase[1]	64·6	18·5	16·9	—	—	—	—	—	—	—	—
	Oligoclase	64·7	23·9	1·2	8·1	2·1	—	—	—	—	—	—
	Anorthite	43·1	36·8	—	—	20·1	—	—	—	—	—	—
	Labradorite	52·9	30·3	—	4·5	12·3	—	—	—	—	—	—
Kaolin[2]		46·3	39·8	—	—	—	—	—	—	—	—	13·9
Mica[3]		50·0	36·0	9·0	1·0	4·0	—	—	—	—	—	—
Zircon		33·2	—	—	—	—	—	—	—	66·8	—	—
Hornblende[4]		45·0	12·0	—	—	13·0	15·0	15·0	—	—	—	—
Schorl[5]		39·0	38·0	—	—	—	10·0	—	—	—	8·0	—
Glauconite		52·0	8·0	7·0	—	2·0	5·0	15·0	—	—	—	11·0
Iron Pyrites		—	—	—	—	—	—	46·7	53·3	—	—	—

[1] Orthoclase usually has small, variable proportions of lime, iron, magnesia, and soda.

[2] This is the chemical composition of pure white clay, and is inserted here for comparison with other minerals to show the chemical nature of impurities in clay.

[3] This refers to muscovite mica, which generally has a small percentage also of fluorine; biotite is characterised by the occurrence of from 15 to 30 per cent. of magnesia.

[4] Hornblende is very variable in chemical composition. The average analysis here given refers to the dark-green varieties of the mineral, which are frequently alluded to as "aluminous hornblende," in contradistinction to the lighter-coloured varieties, which are chiefly meta-silicates of magnesium and calcium, and are typically "non-aluminous," but have small proportions of the protoxides of iron and manganese. These latter varieties are not often met with in brick-earths, and need not be further noticed.

[5] Schorl varies a great deal; in addition it mostly has small proportions of phosphoric acid, ferrous oxide, lime soda, potash, manganous oxide, lithia, fluorine, and water.

Iron. — Magnetite = ferroso-ferric oxide, iron 72·41, oxygen 27·59; limonite = hydrous ferric oxide, iron oxide 85·56, water 14·44, and hæmatite = anhydrous sesquioxide of iron, iron 70·0, oxygen 30·0.

Rutile = oxide of titanium; or, titanium 60·98, oxygen 39·02.

Augite is extremely variable in composition. The aluminous variety has from 47 to 56 per cent. of silica, 4 to 9 per cent. of alumina, and a little ferrous oxide; the non-aluminous consists of meta-silicates of magnesium and calcium, frequently with some proto-silicate of iron and manganese.

Selenite is the crystalline form of gypsum = hydrous sulphate of lime, sulphuric acid 46·51, lime 32·54, water 20·95.

Calcite and Aragonite have the same chemical composition = calcium carbonate, carbon dioxide 44·0, lime 56·0.

"MAGAZINES AND REVIEWS."—Owing to pressure on our space, we are obliged to hold over our usual notice of the contents of current magazines.

GENERAL BUILDING NEWS.

CHURCH SCHOOL, PENZANCE.—The foundation-stone of a day school for St. John's, Kedinnick, Penzance, was laid recently by Mr. T. R. Bolitho. The school will occupy a piece of ground near St. John's Church, and accommodate 292 children—126 boys, 86 girls, and 80 infants. Each department will be distinct, with separate playground, entrance, and necessary offices. Mr. Henry White is the architect. The contracts have been entrusted to Mr. T. James, carpenter, and Mr. E. Pidwell, mason; Mr. J. Ball, of Truro, being clerk of the works.

NURSES' HOME, SOUTH-EASTERN HOSPITAL.—In giving some particulars of this a week or two back (page 70 *ante*) we gave Mr. J. S. Quilter's name as the architect. He writes to ask us to correct this, and to state that it should have been Messrs. Quilter & Wheelhouse.

CATHOLIC CHURCH, WEST HARTLEPOOL.—On the 5th inst. a new Catholic Church was opened at West Hartlepool. The building has been dedicated to St. Joseph. The new church, the estimated cost of which is 13,000*l.*, is now practically completed. With the exception of the tower, of which only the foundations are laid, the whole design of the church has been carried out. The church, which has been built from the plans and under the superintendence of Messrs. Dunn, Hansom, & Fenwicke, architects, of Newcastle-on-Tyne, is a structure of an early type of English Gothic architecture. It is a brick building, faced externally with red Grosmont bricks, and having dressings of red sandstone, the roofs being covered with green Westmorland slates. The window tracery is worked in Combe Down stone. Bath stone is also used in the interior for the arcade, &c. The church consists of a nave and aisles, a chancel, terminating in semi-decagonal apse; north chapel, a south transept containing a chapel, with organ gallery above, and will have a tower at the north-west corner. The nave and chancel are 28 ft. wide, with a combined length of 139 ft. The width across nave and aisles is 60 ft., and the latter are 86 ft. long. The chapel, at the ends, is 26 ft. long by 13 ft. in width. There are two large sacristies adjoining the south transept for the clergy and choir, and a staircase leading to the organ-chamber, the heating vault being below. There is a row of confessionals opening from the south aisle, but entered by the clergy from a corridor at the back, connected with the sacristies. These and the church are warmed by hot-water apparatus. The nave is covered with a hammer-beam roof of pitch-pine, partially ceiled (above its main arch) at a height of 51 ft., and the whole lined with boarding, being divided into panels by mouldings. Immediately above the wall-plate, which is 40 ft. above the floor, is a band of open tracery. The chancel roof is panelled to the curve of the arch above the hammer-beams. The wood-carving has been done by Mr. Ralph Hedley, of Newcastle, who has also executed the screens, organ-gallery front, credence table, aumbries, &c., in oak. There are many angels, sculptured heads, and some foliage in the interior, carved in Bath stone by Messrs. Boulton & Sons, of Cheltenham. The gargoyles round the exterior of the apse were carved by Mr. Milburn, of York. The floors generally are of pine blocks upon concrete, but the passages in nave and aisles are of Rust's vitreous mosaic, and the chancel floor is laid with Italian marble mosaic. Sitting accommodation is provided for about 800 persons. Mr. Wm. Armstrong was the clerk of works, and the various contractors were as follows:—Preliminary contract for foundation, Mr. Joseph Howe, West Hartlepool; general contractor, Mr. Thomas Dickenson, Middlesbrough; Bath stone work, Mr. Hy. W. Bladwell, Bath; heating, Messrs. Bland Bros., West Hartlepool; Rust's vitreous mosaic, Messrs. H. Walker & Son, Newcastle; marble mosaic, Messrs. Emley & Sons; pitch pine benches, Messrs. T. Walker & Co., West Hartlepool; gas-fitting, &c., Messrs. Singer & Sons, Frome.

BOARD SCHOOLS, WALLSEND.—On the 4th inst. the new senior Board Schools recently erected at Carville, Wallsend, were opened by Mr. Geo. R. Hunter. The new schools are erected on the central hall arrangement, from designs by Mr. Wm. Hope, of Newcastle and Shields, the main apartment being 61 ft. long by 22 ft. wide, flanked by six class-rooms—three on each side—each capable of seating sixty senior scholars.

WOODSIDE NEW WESLEYAN CHURCH, HORSFORTH, YORKSHIRE.—A Wesleyan Church has recently been erected at Horsforth under the supervision of Messrs. Fairbank & Wall, architects, Bradford, at a cost of 2,250*l.* The various works have been carried out by the following contractors:—Mr. Thomas Lawrence, Horsforth, mason; Messrs. B. Child & Sons, Horsforth, joiners; Mr. T. Brearcliffe, Horsforth, plumber; Messrs. R. Dixon & Co., Bradford, plasterers; Messrs. Hill & Nelson, Bradford, slaters; and Mr. Simpson Cockcroft, Allerton, painter.

ALEXANDRA PARADE U.P. CHURCH, GLASGOW.—This new church, which is situated in Alexandra Parade, at the corner of Firpark-street, is built of Ballochmyle red freestone, and has been designed by Mr. Petrie, architect, Glasgow, in the Early English style. The principal front is to Firpark-street. The entrance doorway has an arched top, supported on either side by Aberdeen polished granite columns, with moulded freestone capitals and bases. Above the main entrance is a three-light window filled with tracery. The window and door are flanked by two stone piers which rise the full height of the gable, and are finished with moulded splayed cornices and surmounted by stone finials. The accommodation provided in the area and gallery of the church extends to nearly 700 seats. Behind the church and fronting the Parade is a session-house, vestry, and church officer's house. Over these apartments on the first floor is a hall capable of seating 330 persons. The roof of the interior is of wood, and the pews are finished in pitch-pine. The pulpit and all the doors are finished in yellow pine, stained and varnished. The contractors were:—Mason work, Alex. Eadie & Son; joiner work, Chas. Gray & Son; plumber work, Ingleton & Co.; slater work, J. M'Ouat & Son; plaster work, Wm. Tonner; heating, Jas. Cormack & Sons; painter work, Thos. Lawrie & Co.; gates and railings, M'Callum & Hope.

SANITARY AND ENGINEERING NEWS.

THE EDINBURGH WATER SCHEME.—A special meeting of the Edinburgh Town Council was held in the Council Chambers recently, Lord Provost M'Donald presiding, for the purpose of considering (1) report by the Lord Provost's Committee on a letter from the clerk to the Edinburgh and District Water Trust recommending approval of the Tweed or Talla scheme for an additional water supply for the city and district; (2) draught of the proposed Bill being promoted by the trustees; and (3) Parliamentary notice of proposed alteration or repeal of statutory provisions by the Bill. The Lord Provost formally moved the approval of the report, and that no action be taken with reference to the Parliamentary notice. Mr. Colston seconded. He pointed out that the statutory authority on the question had satisfied themselves that an additional supply was necessary. There was no need of alarm that the burden upon the ratepayers would be heavier than they could bear. In the year 1873-4 the amount realised for water sold through meters at 9d. per 1,000 gallons was only 8,665*l.* In 1883-4 this had increased to 12,149*l.*; while in 1893-4, the rate being reduced to 6d. per 1,000, it realised 25,733*l.* The result had been that the domestic rate had been reduced from 9d. to 5½d. per 1*l.* Treasurer Macrae moved as an amendment that the Council recommend the Trustees not to proceed with a new water-scheme in the ensuing Session of Parliament, so that an opportunity be afforded for fully considering the relative merits of the two schemes reported on by the Trust's engineer on September 25, 1894. The Talla scheme worked out at 83,120*l.* per one million gallons, as compared with 54,000*l.* for the St. Mary's Loch scheme, being a difference of 29,000*l.* per one million gallons. The present supply of 15 million gallons should last for twelve years, and they should pause before they entered upon an additional expenditure of three-quarters of a million. Bailie Macpherson seconded the amendment. The Lord Provost's motion was adopted by 20 votes to 15 given in favour of the amendment, two members declining to vote.

FILTER PRESS MACHINERY FOR SEWAGE DISPOSAL WORKS.—A meeting of the Royal Scottish Society of Arts was held in the hall, 117, George-street, on the 28th ult., Dr. William Taylor, President, in the chair. Mr. William Fairley, engineer, Richmond Main Drainage Board, read a paper on "Filter Press Machinery for Sewage Disposal Works." Mr. Fairley dealt with the most recent practice of disposal, in destructors, by steam barges, as carried out by the London County Council, and by filter presses. A description was given of a large plant put down by him, embodying many improve-

ments, and combining the advantages of both the air pressure and the direct pumping systems. He also gave particulars of a system applicable to works for small towns, where not only the sludge pressing but all operations requiring mechanical power were carried out by compressed air, generated by a small oil-engine, with considerable saving on the first capital outlay and annual maintenance. In the discussion which followed the subject of purifying sewage by electricity was mentioned, and Mr. Fairley stated that he would be able to bring forward a system by which the process of electrical treatment would be very much cheapened. At present, where electric lighting had been put down, the great cost was caused by the unequal load during the twenty-four hours, and his suggestion was to treat the whole of the sewage by electricity, and use the filtering medium for the purpose of assisting in generating the steam. Under that system the sewage purification and the lighting of the public streets would be done by the same engine and plant and by the same manual labour, thereby reducing the cost.

SEWAGE WORKS, UPPERMILL.—The first sod of the sewage outfall works for this district was cut on the 31st ult., by the Chairman of the late Local Board, Mr. J. Taylor Bradbury. The International Sewage Purification Company precipitation process, by ferozone, and filtration through polarite, is the one adopted. The engineer has provided circular tanks, with the improved arrangements for sludge removal. The contract has been let to Messrs. H. Fotherby & Son, Burnley, who will proceed with the work forthwith.

SANITARY ENGINEERING APPOINTMENT.—Mr. W. Kaye Parry, M.A., has been appointed by the Board of Trinity College University, examiner in practical sanitary engineering for the qualification of State medicine in the University of Dublin.

MISCELLANEOUS.

VENTILATORS FOR MANHOLES, CELLARS, &c.—Under the title the "Simplex Ventilator System," Messrs. Peirson & Co. (London) propose a cast-iron ventilator tube, to be laid below foot pavements, with an inlet in the edge of the kerb, for the purpose of admitting to manholes, underground cellars, &c. The point of the proposal is derived from the recent Board of Trade enquiry into the explosion in the City, which shows, say Messrs. Peirson in the circular illustrating their method, "that the laying of electricity supply cables thoughout the streets in close proximity to gas supply mains and sewer conduits has made it an imperative necessity to have a thorough system of ventilation applied to the manholes and places of similar construction in connexion with any such subterranean works, to avoid the accumulation of gas in the manholes, &c." That the ventilation of places where gas may accumulate from leakage, or the provision for dispersing the gas, may become an important consideration where electric mains are laid in contiguity with gas-mains, we have recently had only too good reason to recognise, and the method proposed by Messrs. Peirson is a well-meant attempt to this end, though it can hardly be called a system. We see that it is "provisionally protected," but we hardly see how there can be any patent rights in use of an iron pipe to admit air; the particular position in which it is proposed to lay the pipe is the only special feature about it.

SURVEYORS' INSTITUTION.—Of the candidates who presented themselves at the preliminary examination of the Surveyors' Institution, held concurrently in London and Manchester on the 23rd and 24th ult., the following satisfied the examiners:—J. H. Addie, Welshpool; S. W. Ambler, Woburn; B. B. Baddeley, Stamford Hill; J. Banks, Manchester; H. B. Baverstock, Godalming; E. C. Bedwell, Brentwood; M. C. Blunt, London; G. Bowden, Westhoughton; H. Bowden, Newport, Barnstaple; W. N. Brackett, Orsett, Essex; F. H. Burrows, Ashford; T. A. M. Castle, London; C. Chart, Mitcham; C. W. Clarke, Leeds; W. Clarkson, London; H. Collins, High Wycombe; G. F. Cox, Maidstone; C. Crowther, Haulgh, Bolton; H. J. H. H. Daniel, near Saltford, Somerset; T. F. Dunningham, Colchester; F. B. Evans, Maidstone; C. R. Field, Anerley, S.E.; E. C. Fielder, Milbourne, Malmesbury; A. L. Fitch, Reading; P. A. Flower, Wycombe; N. M. Foulkes, Tring, Herts.; A. E. Gayer, Bristol; D. F. Goldsmith, Blendworth, Horndean, Hants; H. G. Gomm, Brentford; C. S. Goodchild, Halstead, Essex; H. Goodbehere, Longsight, Manchester; G. E. H. Graham, London; H. N. Gray, Forest Gate, E.; J. E. Gripper, Chichester; J. F. Hawkins, Bromley, Kent; H. Heal, London; T. Hood, jun., Duns, N.B.; R. E. Jackson, Gowan, Carnforth, Lancs.; C. B. Joseph, Stratford, E.; L. E. Jones, London; A. C. Key, London; N. P. Laird, Kirby Muxloe, near Leicester; C. F. D. Lang, London; C. A. Madge, St. Albans; W. M. Marcus, London; J. Millward, London; H. A. Newman, Parkstone, R.S.O., Dorset; W. Paice, Woolacombe, N. Devon; T. W. Pearse, Modbury, Devon; F. A. Pinfold (passed at head of list), Rugby; F. R. Phipps, Tewkesbury; J. R. Pineger, Newbury, Berks; W. S. Protheroe, Leytonstone, Essex; W. H. Ratcliffe, Accrington; D. W. Reeve, Sutton; R. E. Robinson, London; H. Sheldon, Middlewich; P. C. O. Sheppard, Neath, South Wales; A. S. Shorney, Reading; L. S. Simpson, London; F. C. W. Stacey, London; H. O. Stallard, Leighton Buzzard; H. P. Stimpson, London; C. M. Stratton, Edgbaston, Birmingham; R. N. Stringer, Taunton; F. S. Sutton, London; J. G. Tate, Tonbridge, W. H. Tomkins, Croydon; R. L. Turner, Market Harborough; J. G. Weall, Watford; H. P. F. Weaver, Pedmore, near Stourbridge; W. W. Wheston, Thames Ditton; T. A. Whitby, London; P. Whitton, Forest Gate, E., C. A. Willoughby, Croydon; G. F. Wilson, Forest Gate, E.; J. P. Wilton, Sefton Park, Liverpool; R. Wood, London; H. E. A. Woods, Sidcup; H. G. B. Wyatt, Chichester.

BRISTOL MASTER BUILDERS.—On the 30th ult. the annual meeting of the Bristol Master Builders' Association was held at the offices of the Bristol Chamber of Commerce, when the President (Mr. Geo. Humphreys) was in the chair. The Secretary (Mr. H. J. Spear) read the annual report, and on the motion of the President, seconded by Mr. E. T. Hatherley, the report and accounts were approved and adopted. The President proposed, and Mr. A. R. Krauss seconded, the election of Mr. George Wilkins, of the firm of Messrs. R. Wilkins & Son, as President of the Association for the current year. This having been carried, Mr. Wilkins briefly returned thanks to the members for the compliment paid to him. On the motion of Mr. W. H. Cowlin, seconded by Mr. W. Podger, Mr. C. A. Hayes was elected Vice-President for the ensuing year. By a motion which Mr. Humphreys proposed and Mr. Krauss seconded, Messrs. J. E. Davis, A. J. Beavan, J. James, and W. Galbraith, members of the committee retiring in accordance with the rules, were re-elected, and Messrs. W. Podger and E. Love to fill vacancies caused by the resignation of two members. Mr. Humphreys was re-elected Treasurer by acclamation, and was also thanked for the manner in which he had carried out the duties of President during his year of office. The annual dinner was held in the evening at the Royal Hotel. Mr. W. H. Cowlin proposed "Our Civic Rulers." Mr. Pearson responded. Mr. E. G. Clarke submitted "Trade and Commerce," and Mr. G. H. Perrin, replying, said the figures published from time to time by the Docks Committee showed that the present financial year in the Docks estate was satisfactory in every way, and the contractors of the city would soon find employment in providing additional warehouses and other buildings. Mr. E. T. Hatherley in giving the toast of "Architects," wished them all success, and that the builders might share in their prosperity. Messrs. Henry Williams, W. P. Saunders, and Bligh Bond responded. Mr. G. Wilkins submitted "The National Association of Master Builders of the United Kingdom," and Mr. A. Krauss acknowledged the toast, and gave his hearers an account of the useful operations of the National Association. Mr. W. H. Brown proposed "The Bristol Master Builders' Association." The President, in response, reminded the company that unity of action was requisite to bring to a successful issue the object of any association; and in the case of the Bristol Master Builders' Society he thought their objects were worth some efforts to attain. He ventured to hope that the time would soon come when architects would have more confidence in builders, whose position was no sinecure, as they had to find the money and brains to carry out the designs, and act as buffers between capital and labour. He believed it was recognised that the building trade was now the largest employer of labour in the country. The Secretary also replied. Mr. Wilkins spoke in terms of appreciation of the services of Mr. Humphreys as President and Treasurer, and asked his acceptance of an address, which Mr. Spear read. Mr. Krauss presented to Mr. Humphreys a solid silver cigar-case, bearing a suitable inscription, and a gold pen and pencil case. The Chairman acknowledged the gifts, and other toasts having been dealt with, the proceedings soon after terminated.

A HYDRANT FROST POST.—Our attention has been drawn to a stand-pipe made under this title by the Lambeth Brass and Iron Co., intended to screw on to a nozzle in the street-main for special supply of water to houses whose internal supply-pipes are frozen. The vertical pipe is of tolerably thick iron, and the taps on the cross-head at the top are protected from frost by an outer casing of thick metal with a space between that and the brasswork. The "Frost Post" can of course only legally be applied by the water-companies, and they are made with different nozzles to suit the gear of the different companies, several of which have some of these standards in stock, but do not apparently make much use of them. We hear already of houses which have been for some days without water-supply in consequence of the freezing-up of the supply-pipe. Use should certainly be made of any convenient means of drawing water direct from the main under special circumstances of this kind.

THE COMMISSION OF SEWERS.—The first meeting of the new Commission was opened on Tuesday by the Lord Mayor, when Mr. Gordon was elected Chairman. The remaining officers were subsequently reappointed. The defective drainage of property in Jewin-street was again the subject of a report by the Medical Officer of Health, but in consequence of the estate being in bankruptcy there had been much delay in making the necessary repairs. It was now decided to instruct the contractor to carry out the necessary repairs or reconstruction, the persons responsible being sued for the cost under the provisions of the new Public Health Act.

PRESENTATION TO AN ARCHITECT.—At a county gathering in Truro Town-hall, on the 4th inst., the Mayor of Truro (Mr. Silvanus Trevail), a well-known West-country architect, was presented with a testimonial subscribed to by persons all over Cornwall. It consisted of a dinner, tea, coffee, and dessert services, a seven-light candelabra, and other articles, mostly silver, and a cheque for 100 guineas. The salver bore the following inscription beneath Mr. Trevail's crest and the county and borough arms:—"This service of plate, together with a cheque for 100 guineas, was presented to the Right Worshipful the Mayor of Truro, Silvanus Trevail, Esq., J.P., C.C., F.R.I.B.A., on Monday, February 4th, 1895, in the Town Hall, Truro, by the Right Hon. the Earl of Mount-Edgcumbe, Lord Lieutenant of the County of Cornwall, on behalf of the subscribers, in grateful recognition of the valuable services rendered by Mr. Trevail to the County during the Parliamentary Session, 1894, in the matter of the railway development of Cornwall." The service is in Queen Anne style.

PONTYPRIDD MASTER BUILDERS' ASSOCIATION.—The third annual banquet of the Pontypridd Master Builders' Association was held at the New Inn Hotel on the 31st ult. The chair was occupied by the President (Mr. D. Williams). Replying to the toast of "The Architects and Surveyors," Mr. Edward Rees, Surveyor to the District Council, urged that the County Council should at once grapple with the question of water supply. There was only a population of 8,000 in Pontypridd when the defunct Local Board was formed, but now it was 31,000, and he predicted that it would be 70,000 in another ten years. "The Town and Trade" was responded to by Mr. W. Jones, manager of the Pontypridd Waterworks, who referred to the many thousands of pounds which the Pontypridd Waterworks Company were about expending in the erection of a new reservoir. Before the close of the proceedings Mr. A. Richards was presented with a gold chain and pendant in recognition of his services during the past three years as Hon. Secretary of the Association.

NOTTINGHAM MASTER BUILDERS' ASSOCIATION.—The Nottingham Master Builders' Association have just held their annual meeting at the Mechanics' Institute, Mr. George Fish, the President, occupying the chair. The annual report showed that great depression still prevails in the building trade, although the progress of several large works in the town, the new Post Office, the Prudential Assurance offices, Borough Club, Messrs. Heymann's warehouse, and the railway extension, had kept the operatives fairly busy in several branches of the trade. During the past year a large number of well-attended meetings had been held, and many matters of great interest to the trade, such as the testing of drains, borough by-laws, working hours of artisans, laying of cement floors, Borough Engineers' printed instructions to builders, measuring timbers, worked stone brought into town, architects' quantities, uniform form of contract and arbitration clause, priced quantities, workmen's cheap railway fares, new builders' price-book, &c., had been brought before the members. The audited statement of accounts was submitted and passed. The President stated that in the past year the number of members had increased. He wished to acknowledge the courteous and kindly manner in which the Town Clerk and Borough Engineer had been pleased to receive the various deputations which had waited upon them. He mentioned also that the Association was closely allied with the Master Builders' Association of Great Britain. Mr. Enoch Hind was elected President, and Mr. James Wright Vice-President, for the ensuing year. Votes of thanks to the retiring officers closed the meeting.

CONSTRUCTIVE ART IN EARLY EGYPT.—On the 5th inst., before the Leeds Philosophical and Literary Society, Professor Goodman, M.I.M.E., of the Yorkshire College, gave a lecture on "Constructive Art in Early Egypt." Professor Goodman, in the course of his remarks, said that the city of Memphis was built by King Menes about 4,500 years before Christ, and about 500 years after the foundation of Memphis some of the pyramids were built, though the Sphinx, which was close to the pyramids of Gizeh, was in all probability built even earlier than the city of Memphis. From the specimens of their building, it was evident that at that early date the Egyptians were very highly skilled, and some of the work they did would have been creditable to modern architects and engineers; in fact, far more creditable than some of the work that was seen at the present day. The question naturally occurred how long could the Egyptians have been a nation, seeing that they showed such magnificent work as were the pyramids, even in an early stage of their career. Then the question arose what were the pyramids built for. The temple theory alone or the tomb theory would not hold, and the only conclusion that could be arrived at was that the pyramids were built partly as temples and partly as astronomical observatories.

STAINED GLASS WINDOWS AND PAINTED GLASS.—In the course of his third and concluding lecture at the Royal Institution on the 2nd inst. on "Stained Glass Windows and Painted Glass," Mr.

COMPETITIONS AND CONTRACTS.

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered.
*New School	Swanage School Board	30*l.* 15*l.*	Mar. 6
*Infectious Diseases Hospital	Penzance Town Coun.	31*l.* 10*s.* 21*l.* and 15*l.* 15*s.*	Mar. 19
Cottage Homes, Erdington, near Birmingham	Aston Union	70*l.* 30*l.*	Mar. 30
*Shops, Offices, Two Hotels, &c. Preston	N. Miller	150*l.* 100*l.* and 50*l.*	April 27
*Technical Institute and Public Library	Boro' of West Ham	250*l.* 150*l.* and 100*l.*	May 1
*Schools	Portmadoc County Schools		No date

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
Sewerage Works (Contracts 693-5)	Bolton Town Council	*Official*	Feb. 12
Granite and Quartzite Road Metal and Kerbing	Dover Town Council	do.	do.
Reconstructing Hayles Pond Bridge, near Midgham	G. W. Ry. Co.	do.	do.
*Portland Cement, Ballast, and Pitchers	Borough of West Ham	L. Angell	do.
Culvert	Farnworth (Lancs.) U.D.C.	W. J. Lomax	Feb. 13
Whinstone and Flag Road Metal, North Shields	Tynemouth R.D.C.	John Waters	do.
Eight Houses, Whalley Old-road, Blackburn	Daisyfield Co-op. Soc. Lim.	J. B. Thornley	do.
Flagging and Paving, Cross-street, &c. near Manchester	Stretford U.D.C.	H. Royle	do.
*Works and Materials	Parish of St. John's, Hampstead	*Official*	do.
Road Materials	Congleton (Cheshire) Corporation	Randle Burslam	Feb. 14
Houses, Udny and Dudwick Estates, Aberdeen, N.B.	Wilsone & Duffus		do.
*Carting Rubbish and Supplying Carts	St. Marylebone Vestry	*Official*	do.
*Works at Walthamstow and Leyton	Midland Railway	do.	do.
*Folding Chairs for Parks, &c.	London County Council	do.	Feb. 15
*Road Materials	Com. of H. M. Works	do.	do.
Macadam (12,000 tons)	Hull Corporation	A. E. White	do.
Public Baths	Nottingham Corp.	A. Brown	do.
Additions to Stores, near Gateshead	Windy Nook Co-op. Soc.	H. Miller	do.
Alterations, &c. to Warehouse, Marketplace	Dewsbury Corp.	*Official*	do.
Station Buildings, Belfast	Belfast and Northern Counties Ry. Co.	do.	Feb. 16
New Street, with Drains, &c. Wrexham	R. H. Done	J. E. Thomas	do.
*Brick Sewers	Rawtenstall & Bacup Joint Sewerage Com.	H. A. Cutler	do.
*Works and Materials	St. Mary (Battersea) Vestry	J. T. Pilditch	do.
*Cleansing and Repairs to Three Weighbridges	do.	*Official*	do.
*Widening Line, Croydon	L. B. & S. C. Ry.	do.	Feb. 18
Schools, Blackfriars-street	Salford School Board	H. Lord	do.
Storage Reservoir, Eastside Burn, near Biggar, N.B.	Airdrie and Coatbridge Water Co.	M'Creaths & Stevenson	do.
Ironwork for Sewers	Ashton-under-Lyne Corporation	J. T. Earnshaw	do.
Vicarage, Savile Park-road, Halifax		Horsfall & Williams	do.

CONTRACTS—*Continued.*

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
Alterations, &c. to Schools, Hirwain, Aberdare	Managers	T. Roderick	Feb. 19
Schools, Groomsport, Ireland	J. McLaren		do.
*Making-up Roads	Boro' of Croydon	*Official*	do.
*Heating Schools	Southampton Sch. Bd.	Lemon & Blizard	do.
*Wood Paving Works	Kensington Vestry	W. Weaver	do.
Pier Work	Dover Promenade, Pier & Pavilion Co. Lim.		do.
Stables, Langton's, Alresford, Hants		J. J. Webster	do.
Schools, Foundry-place, Daventry	Trustees	J. Colson & Son	Feb. 26
Three Houses, Newcastle, co. Down	J. W. Alexander	J. B. Williams	do.
Surveyor's Materials	Rawtenstall (Lancs.) Corporation	H. Hobart	do.
Villa and Stables, Rayleigh, Essex		*Official*	do.
Houses, Donaghadee, Ireland	Peter Lindsay	Jas. Thompson	Feb. 21
Additions, &c. to House, Beckett-street, Leeds		Thos. Pentland	Feb. 22
*Supply of Materials	Jos. Hick	T. Butler Wilson	do.
*Making-up Roads, &c.	Walthamstow U. D. C.	G. W. Holmes	do.
Business Premises, Picton-street, Leek, Staffs.	do.	do.	do.
*Somerton, &c. Waterworks	Leek and Moorlands Indus. Prov. Soc.	W. Sugden & Son	Feb. 22
*Sewerage Works	Langport R. D. C.	J. T. Hawkins	do.
Schools	Filey U. D. C.	*Official*	do.
*Supply of Materials	Bourne (Lincs.) School Board	do.	Feb. 24
*Boundary Wall, &c. at Hospital, Tooting	St. Mary (Newington) Vestry	do.	Feb. 23
*Fencing, Gates, &c. Park Hospital, Lewisham	Met. Asylums Board	A. H. Tiltman	do.
*Sewerage Works	do. Little Woolton U.D.C.	E. T. Hall	do.
Stoneware Pipe Sewers, St. Helen's-crescent		Wood & Brodie	do.
School Buildings, Embleton, Northumberland	Hastings Corp.	P. H. Palmer	do.
Methodist Church, Ballymena, Ireland	Committee		do.
Additions, &c. to Hospital, Woodbridge	Committee	J. J. Phillips	do.
*Well in Brickwork and Cast-Iron Cylinders	Guildford, Godalming, and Woking Joint Hospital Board	E. L. Lunn	Feb. 26
*Works and Materials	East Cowes U.D.C.	Lemon & Blizard	do.
*Asphalte Paving Works	West Ham Council	Lewis Angell	do.
*Three Hundred Quarter Malting	Poplar Union	*Official*	Feb. 27
*Technical School	Brighton Council	Evans & Son	do.
Well-Sinking, Reservoir, &c. Heckington, Lincs.	Sleaford R.D.C.	F. J. C. May	Mar. 1
Flint and other Road Material, Lewes	East Sussex C C.	J. Clara	Mar. 2
*School and Residence	Ashford School Board	Hy. Card	Mar. 4
*Works and Materials	Bath U. S. A.	H. J. Jeffery	do.
Granite, Retford Stations	East Retford Corp.	*Official*	Mar. 5
*School Building, Water-lane	West Ham Sch. Bd.	J. D. Kennedy	do.
Four Houses, Audenshaw-road, Audenshaw, Lancs.		Newman & Jaques	Mar. 12
Baptist Chapel, Irwell-terrace, Bacup		J. H. Burton	No date
Three Shops and Houses, Meadow-lane, Leeds		Smith & Cross	do.
Three Houses, Rigton, Yorks	J. A. Denison	Windsor Thorp	do.
Brick Sewers, &c.	Ashton-under-Lyne Corp.	Geo. Riley	do.
Offices and Stabling, Cardiff	W. Hancock & Co.	J. T. Earnshaw	do.
Wooden Blocks and Bricks, Brighouse, Yorks.	J. Blakeborough & Sons	Richards & Budgen	do.
Three-story Mill, Glossop	Olive & Partington		do.

Those marked with an asterisk (*) are advertised in this Number. Competitions, p. iv. Contracts, pp. iv., vi., vii., viii., and xxi.

Lewis F. Day dealt with the influence of Renaissance art. He said that concurrently with the later Gothic manner, which lasted until about 1530, there flourished a newer phase of art—the Renaissance. So far, however, from there being any marked deviating line between Gothic and Renaissance glass, it was often only by the character of some slight ornamental or architectural detail that one could determine in which category a window of the early part of the sixteenth century should be classified. The fact was the Gothic influenced the glass painters almost as long as good work continued to be done, and it might almost be said that with these Gothic conditions died the art. Yet the most brilliant achievements in glass painting were inspired by the new enthusiasm. Having dealt with the "Jesse" windows, Mr. Day said that the donor of a window was always a most important person. In early days, however, he was content to efface himself, or at most to appear in miniature and quite modestly in the corner of a window. But in the sixteenth century he was very much *en évidence*, and no scruple would restrain him from putting in an appearance in the very midst of a most sacred subject. Yet the vainglory of such men resulted in the production of works of such consummate art that we in our generation could only be grateful to them. The lecturer concluded with a consideration of the decline of glass design and the characteristics of seventeenth-century windows.

CAPITAL AND LABOUR.

LABOUR IN THE MANCHESTER BUILDING TRADES.—Three sections of the workmen employed in different industries connected with the building trade in the Manchester district are agitating for an increase of wages and for alterations in the conditions of labour—the plasterers, who are affiliated to the National Association of Operative Plasterers, the carpenters in the Amalgamated Association of Carpenters and Joiners, and the painters in the Amalgamated and "Old" Societies. The plasterers at present are paid at the rate of 8½d. per hour, and their hours of work are in summer fifty-two and in winter forty-seven per week. They ask that the rate of pay shall be advanced to 9½d. per hour, and that the hours of work shall be 49½ in summer and 44½ in winter. The workmen further ask for an alteration in the "mileage" allowance for reaching work. The operatives ask that the distance for allowance shall be put at one mile. The painters ask for an increase of wages and other alterations, and the carpenters and joiners, amongst other matters, ask for an increase of wages of ½d. per hour. The present rate is 8½d. Six months' notice of alterations has been given. In the case of the plasterers the notices expire at the beginning of April, and in that of the joiners at the beginning of May. The matter will, it is stated, be considered at joint meetings of the employers' and the operatives' representatives.—*Manchester Guardian.*

THE LABOUR DISPUTE, DOUGLAS, ISLE OF MAN.—The labour dispute in the Douglas, Isle of Man, building trade, has been amicably settled. The plasterers, who demanded 34s. a week instead of 30s., have accepted 32s. The labourers, who demanded 24s. in lieu of 21s., have accepted 22s. 6d. This agreement is to last for three months.

MEETINGS.

FRIDAY, FEBRUARY 8.

Institution of Civil Engineers (Students' Meeting).—Mr. C. H. Godfrey on "The Construction and Maintenance of Roads." 8 p.m.

Sanitary Institute (Lectures and Demonstrations for Sanitary Officers).—Mr J. Castell-Evans on "Physics and Chemistry: the Atmosphere; its Physical Properties." III. 8 p.m.

SATURDAY, FEBRUARY 9.

Queen's College, Cork.—Mr. Arthur Hill on the "History of Architecture." X. 3 p.m.

SUNDAY, FEBRUARY 10.

Sunday Lecture Society.—Mr. R. D. Roberts, M.A., on "Deep Sea Explorations in their Geological Bearings." 4 p.m.

MONDAY, FEBRUARY 11.

Royal Institute of British Architects.—Papers on "The Value of Simplicity in Architecture," by Messrs. Halsey Ricardo, Basil Champneys, B.A., and others. 8 p.m.

Royal Academy.—Professor Aitchison, A.R.A., on "The Advancement of Architecture." V. 8 p.m.

Liverpool Architectural Society.—Paper by Mr. Leonard Stokes, entitled "On Observation." 6.30 p.m.

TUESDAY, FEBRUARY 12.

Institution of Civil Engineers.—Further discussion on Mr. John Richardson's paper on "The Mechanical and Electrical Regulation of Steam-Engines." 8 p.m.

Sanitary Institute (Lectures and Demonstrations for Sanitary Officers).—Dr. R. T. Hewlett on "Elementary Bacteriology." 8 p.m.

WEDNESDAY, FEBRUARY 13.

Sanitary Institute.—Discussion, to be opened by Dr. George Vivian Poore, on "Dry Methods of Sanitation." 8 p.m.

Northern Architectural Association.—Mr. J. W. Twist on "Ecclesiastical Buildings of Yorkshire."

Society of Arts.—Mr. W. M. Acworth on "Light Railways." 8 p.m.

THURSDAY, FEBRUARY 14.

Royal Academy.—Professor Aitchison, A.R.A., on "The Advancement of Architecture." VI. 8 p.m.

Civil and Mechanical Engineers' Society.—Mr. E. H. G. Brewster on "Waste Preventing Cisterns." 7 p.m.

Institution of Electrical Engineers.—Mr. W. B. Sayers on "Reversible Regenerative Armatures and Short Air Space Dynamos." 8 p.m.

Society of Antiquaries.—8.30 p.m.

FRIDAY, FEBRUARY 15.

Architectural Association.—Mr. H. H. Statham on "The Bridges of London Architecturally Considered." With Illustrations. 7.30 p.m.

Sanitary Institute (Lectures and Demonstrations for Sanitary Officers).—Mr. J. Castell-Evans on "Physics and Chemistry: Water." IV. 8 p.m.

Institution of Junior Engineers.—Mr. Walter J. Fryer on "The Practical Application of Alternating Current Motors." 8 p.m.

SATURDAY, FEBRUARY 16.

Edinburgh Architectural Association.—(1) Visit to 29, Moray-place; (2) Visit to 23, Learmonth-terrace.

Queen's College, Cork.—Mr. Arthur Hill on the "History of Architecture." XI. 3 p.m.

Architectural Association.—Second spring visit, to the new Pavilion Music Hall, Whitechapel-road. Mr. E. A. Runtz, architect. 3 p.m.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

2,293.—BALANCING AND FASTENING SASHES: *D. B. Gillett and another.*—According to this patent the balancing is effected by a rod above the head of the sash-frame having the winding-reels fixed on each end, to which reels are connected suspending bands extending down through openings in the sash-frame to the stiles of the sash. The shaft is rotated by a spiral spring which encircles it. Provision is made for the weakening of the spring on raising and lowering the sash. For fastening, a toothed locking-bar fixed to the stile of each sash engages with a pair of dogs mortised into the casing of the sash-frame.

3,608.—EXHAUST VENTILATORS: *H. J. Johnson.*—A ventilator formed somewhat like the Roman capital T, with an exhaust air-shaft and superinducing chamber actuated by either natural or induced air currents. The ventilators are divided into two portions to admit of a lamp being enclosed between the two halves.

4,090.—ROOFING: *L. Delmas.*—An octagonal slate for roofing, having four long and four short sides, for holding which a reinforced hook is employed, the head of which constitutes a spring formed of two parallel branches, between which the slate and batten are forced.

4,236.—WINDOWS AND DOORS: *W. Nicol.*—Relates to the fitting in non-sliding windows, doors, &c., of recessed duplex-hooked or overlapping plates on the swivelling parts and fixed frames, to form waterproof joints in combination with the ordinary hinges on which the door is swivelled.

4,868.—BLOWERS FOR FIREPLACES: *T. B. Shuffrey.*—A blower or drawplate, consisting of two shutters hinged to a plate of metal, is so arranged that they can be opened or closed, causing quickening or retarding a current of air through the fuel.

22,688.—CHIMNEY-TOP: *J. Cordner.*—Consists of a base tube on which by wings or ribs other tubes are carried and arranged with the necessary gaps between them to lead the smoke into a channel surrounded by a screen or exterior tube. This is surmounted by an outer and inner cap both having inclined upper surfaces for deflecting the wind through passages at the upper part. The lower end of the outside tube is below the upper portion of the base tube, so that the currents of air are directed upward across passages formed between the inner tubes.

22,702.—EXPANDING PLUG FOR DRAIN PIPES AND TRAPS: *T. Crapper.*—An expanding plug is provided with two discs having annular flanges sliding within one another. A band of indiarubber is confined between the two discs. A lever attached to a lug on being moved causes the discs to compress the rubber band, which expands circumferentially, and closes the pipe or trap to which the plug is affixed.

NEW APPLICATIONS FOR LETTERS PATENT.

JANUARY 21.—1,365, A. Calvert and W. Durant, Securing Slates in position upon Roofs.—1,368, A. Widmann, ou eBell.

JANUARY 22.—1,432, H. Mills, Attaching and Securing Door and other Knobs to their Spindles, and in the Roses in connexion therewith.—1,441, T. Littlehales and G. Martin, Dry Glazing.—1,442, C. Clarke and W. Theermann, Electrical Ceiling Roses.—1,445, T. Harris, Combined Gully-trap, Air-inlet, and Inspection-shaft.—1,450, G. Wallis and J. Gibson, Draught Excluder for Doors, &c.—1,464, H. Sampson, Excluding Draughts from Doors, &c.—1,465, J. Walker, Telescoping Portière Rods for Doors.—1,513, P. Newton, Interlocking Tubular Bricks for Flues.—1,522, A. Conway, Chimney Pot.—1,539, J. Frei, Hinges.

JANUARY 23.—1,558, J. Williams and H. Darrah, Ceiling Roses and similar Electric Fittings.—1,588, F. Whitehouse, Ratchet Braces.—1,596, P. Macfadyen, Manufacturing Pipes, Junctions, &c., from Portland Cement or other Cement alone or mixed with other matter.—1,607, J. Sampson, Attachment for Saws.

JANUARY 24.—1,631, M. Syer, Syphon-flushing Tanks.—1,638, C. Elliott, Glazing Bars.—1,639, J. Fryer, Bricks and Building Blocks, &c.—1,640, H. Bennett, Draught Excluder for the Bottoms of Doors.—1,648, J. Fleming and E. Woollam, Oven or Kiln.—1,663, W. Davis, Drain Cleaning Machines, &c.—1,666, E. Traies, Water-closets or Water-closet Basins and Traps.—1,673, S. Dix, Wastes for Lavatories, &c.—1,693, W. Crombie and the Paragon Bolt Syndicate, Limited, Mortise Bolts.—1,712, J. Gamble, Adjusting and Fastening Door-handles upon their Spindles.—1,713, B. Mills, Combined Spring Hinges and Door Checks.

JANUARY 25.—1,783, W. Wilding, Carpenter's Gauges, &c.—1,809, P. Newton, Flue or Furnace Bricks, and in Flues, &c., constructed therewith.

JANUARY 26.—1,843, L. Birbeck and M. Butcher, Limited, Weights for Window Sashes.—1,854, G. Blackburn, Electric Burglar-alarms for Door.

PROVISIONAL SPECIFICATIONS ACCEPTED.

23,966, D. McNish, Bath Lavatory Basin (movable).—170, H. Scurfield, Testing the efficiency of Ventilation.—205, H. Worsey, Door Latches and Latches for Door Locks.—235, J. Horrocks, Smoke Preventing Appliances.—393, W. Eckstein and J. Willmore, Ventilators.—596, W. Whitehead, Chimney Cowls for the Prevention of Down Draughts in Chimneys.

COMPLETE SPECIFICATIONS ACCEPTED.

(*Open to Opposition for Two Months.*

2,772, T. Gunton, Self-acting Bolt and Catch Window Fastener.—5,466, W. Beck, Promoting Draughts in Chimney Stacks.—7,092, W. Brighton, Log Band-saw Adjuster.—20,777, F. Müller, Water-closets.—20,855, M. Adams, Lavatory Basins.—24,584, V. Emerson, Dry Kilns.

PRICES CURRENT OF MATERIALS.

TIMBER.		
Greenheart, B.G. ton	8/0/0	0/0/0
Teak, E I. ..load	10/0/0	16/0/0
Sequola, U.S. ft. cu	1/10	2/2
Ash, Canada load	3/0/0	4/5/0
Birch, do.	3/0/0	4/5/0
Elm, do.	3/15/0	5/0/0
Fir, Dantsic, &c.	1/10/0	3/0/0
Oak, do.	2/15/0	4/15/0
Canada	5/5/0	6/15/0
Pine, Canada red	2/15/0	3/5/0
Do. Yellow	3/10/0	5/15/0
Lath, Dantsic, fath	4/10/0	5/10/0
St. Petersburg..	5/0/0	6/10/0
Wainscot, Riga, &c., log	2/15/0	5/0/0
Odessa, crown....	2/15/0	5/0/0
Deals, Finland 2nd & 1st std 100	7/0/0	9/0/0
Do. 4th & 3rd ..	7/0/0	8/0/0
Do. Riga	7/0/0	8/10/0
St. Petersburg, 1st yellow ...	9/10/0	12/0/0
Do. 2nd yellow	7/10/0	9/0/0
Do. white	8/0/0	10/10/0
Swedish	7/0/0	15/10/0
White Sea.....	6/10/0	14/0/0
Canada, Pine 1st	21/0/0	24/10/0
Do. do. 2nd.....	16/10/0	17/10/0
Do. do. 3rd, &c.	7/10/0	10/10/0
Do. Spruce, 1st..	8/10/0	10/0/0
Do. do. 3rd and 2nd	6/10/0	7/10/0
New Brunswick Battens, all kinds	6/0/0	7/0/0
Flooring boards, sq., 1 in. prep. 1st.....	5/0/0	21/0/0
Do. 2nd	0/9/6	0/14/0
Other qualities—	0/7/0	0/11/6
Cedar, Cuba ..ft.	0/5/0	0/7/0
Honduras, &c.	/3	/4
Mahogany, Cuba	/3	/4½
St. Domingo, cargo av.	/3	/6
Mexican do. do.	/3	1/6
Tobasco do. do.	/3	/4
Honduras do....	/3	/6
Box, Turkey ton	/3½	/5½
Rose, Rio	4/0/0	13/0/0
Bahia	7/0/0	18/0/0
Satin, St. Domingo.....	6/0/0	17/0/0
Satin, Porto Rico	0/0/6	0/1/6
Walnut, Italian....	0/0/3½	0/0/7

METALS.		
Iron—Pig, in Scotland .....ton	2/1/2	0/0/0
Bar, Welsh, in London	5/12/6	5/15/0
Do. do. at works in Wales.....	5/2/6	5/5/0
Do. Staffordshire, in London.....	6/0/0	6/10/0
COPPER—British cake and ingot	42/10/0	43/0/0
Best selected ..	43/0/0	43/10/0
Sheets, strong..	51/0/0	0/0/0
Chili bars	40/2/6	40/7/6
YELLOW METAL lb	0/0/4½	0/0/4¾
LEAD—Pig, Spanish ....ton	9/11/3	9/12/6
English com. brands	9/12/6	9/13/9
Sheet, English, 6 lbs. per sq. ft. and upwards ..	10/15/0	11/0/0
Pipe	11/15/0	0/0/0
ZINC—English sheet .....ton	18/10/0	19/0/0
Vieille Montagne	19/10/0	0/0/0
TIN—Straits.....	59/17/6	60/7/6
Australian.....	60/0/0	60/10/0
English Ingots.	64/10/0	64/15/0
Banca.....	61/10/0	62/0/0
Billiton	60/10/0	61/0/0

OILS.		
Linseed .....ton	20/5/0	20/10/0
Cocoanut, Cochin	25/0/0	0/0/0
Do. Ceylon	23/0/0	0/0/0
Palm, Lagos	23/0/0	0/0/0
Rapeseed, English pale	22/0/0	0/0/0
Do. brown	20/10/0	0/0/0
Cottonseed ref. ..	17/2/6	18/0/0
Oleine.....	21/0/0	22/10/0
Lubricating, U.S.	4/0/0	5/0/0
Do. refined	5/0/0	12/0/0
TAR—Stockholm barrel	1/1/0	1/1/6
Archangel.....	0/15/0	1/16/0

TENDERS.

[Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 10 *a.m. on Thursdays.*]

ABERDEEN.—Accepted for the construction [of 630 yds. of 21-in. main pipe-sewer, &c., Don and Wellington-street, Woodside, for the Town Council. Mr. Wm. Dyack, Burgh Surveyor, Town House, Aberdeen :—

Alex. McKay, 35, Jamalca-street, Aberdeen £677 17 6

BARROW-IN-FURNESS.—For the execution of sewage-outfall works, &c. (1,200 yds.), for the Corporation. Mr. Fox, Borough Engineer, Town Hall, Barrow-in-Furness :—

T. Gibson £13,157 13 6		J. Moffat £8,184	6 4
Williamson & Co. 8,351 4 9		E. Watts*..... 7,483	2 7

* Accepted for works complete, including iron pipes.

BIDEFORD.—For the erection of business premises, Market-place, for Messrs. Tattersill & Snow. Mr. R. T. Hookway, architect, Bridgeland-street, Bideford :—

Fulford & Son £1,871 10		Cock & Lamesten*....£1,818	0
E. Ellis..... 1,849 0		* Accepted.	

[All of Bideford.]

BRENTFORD. — For rebuilding "The Bunch of Grapes" public-house, Ferry Island, Brentford, for the Hounslow Brewery Company, Limited. Mr. S. Woodbridge, jun., architect and surveyor, 210, High-street, Brentford :—

Gregory & Co. £1,797	0	J. Barnes.....£1,487	0
Hanson & Co. 1,664	0	T. Hiscock..... 1,460	10
Aviss & Co..... 1,607	0	Dorey & Co. (accepted) 1,460	0
Lansdown & Co..... 1,497	0		

[Architect's estimate, £1,500.]

CARDIFF.—For the erection of school-room at Congregational Chapel, Cowbridge-road. Mr. Edwin Seward, architect, Queen's chambers, Cardiff :—

D. C. Jones £725	0 0	Latty & Co.....£587	0 0
Jones & Thornley.... 667	10 0	H. Morgan 578	14 0
W. Symonds 649	10 0	W. Best & Co. 572	0 0
Hatherley & Carr 627	0 0	C. Price 566	0 0
J. Haines 595	0 0	W. T. Morgan 565	0 0
B. Evans 593	4 0	Knox & Wells 558	0 0
A. Howell 590	0 0	E. R. Evans Bros.... 546	6 9
A. J. Colborne 588	3 8	C. C. Dunn, Cardiff * 534	14 2

* Accepted.

DUNGARVAN (Ireland).—For the execution of building work, walls, &c., at bathing-place, for the Town Commissioners. Mr. Michael Beary, Borough Surveyor, Engineer :—

Hicksons & Peet £399	18 0	George Stokes, Dun-	
John Butter..... 374	18 6	garvan*.....£317	0 0
Dennis M'Grath..... 333	13 10	*Accepted.	

[Engineer's estimate, £353 19s. 3d.]

DURHAM.—For the erection of new Court House, &c., Chester-le-Street. Mr. William Crozier, Durham County Architect, Shire Hall, Durham. Quantities by Mr. J. Ezra Miller, Sunderland :—

Joseph Jopling £1,618	7 2	Kell & Groves £1,416	10 6
Isaac Oates 1,597	5 0	Joseph Elliot 1,410	0 0
Thomas Hunter..... 1,528	17 0	Thomson & Son,	
Gradon & Son..... 1,488	10 0	Chester-le-Street	
Draper & Sons 1,469	15 1	(accepted)..... 1,358	2 6

FAREHAM (Hants.).—For the execution of sewage outfall works, Cosham, for the Rural District Council. Mr. Arch. Ford, engineer, 11, High-street, Portsmouth :—

C. Cooke £1,987	0	W. R. Light & Son,	
J. P. Hall 1,847	0	Portsmouth *.....£1,763	0
F. Bevis 1,780	10	* Accepted.	

FARNHAM.—For erecting the East-street Schools, Farnham. Mr. J. A. Eggar, architect, Farnham, Surrey :—

Hall £7,780	10	Hughes.....£6,469	0
Belham & Co..... 7,473	0	Jenkins & Sons..... 6,449	0
Martin, Wells, & Co.. 6,890	0	Kemp 6,297	0
Patrick & Co..... 6,796	0	Fitt..... 6,279	0
Smith..... 6,757	10	Botrill & Son..... 6,230	0
Chuter 6,598	10	Peters 6,125	0
Field & Co. 6,568	0	Chinchen, Bournemouth* 5,700	0
Goddard & Sons 6,548	0		

* Accepted subject to the approval of the Education Department.

HASTINGS.—Accepted for laying 348 ft. of 15-in., 350 ft. of 12-in., 527 ft. of 9-in. Hassall's patent jointed pipes, and 220 ft. of 6-in. other pipe sewers, High-street, for the Corporation. Mr. P. H. Palmer, C.E., Town Hall, Hastings :—

Geo. Bell, Tottenham.....£398

HUDDERSFIELD. — Accepted for additions, &c., to school buildings, Knowl Bank, Golcar, for the School Board. Mr. J. Berry, architect, 9, Queen-street, Huddersfield :—

Masonry.—A. & T. Haigh, Golcar .....
Joinery.—J. Varley & Son, Slaithwaite.....
Plumbing.—John Marsden, Huddersfield .....
Plastering and Painting.—Ed. Lane, Slaithwaite .....
Slating and Concreting.—W. E. Jowitt, John William-street, Huddersfield..... £2,600
Ironwork.—Leonard Cooper, 32, Park-row, Leeds .....
Wood Block Floor, &c.—John Cooke, Little Royd, Huddersfield .....
Iron Railing.—T. H. Rayner, Market-street, Huddersfield.....

KEGWORTH (Leicester).—For the construction of covered reservoir and distributing mains for the Castle Donington Rural District Council. Mr. Geo. Hodson, C.E., Bank Chambers, Loughborough :—

John Maclean £3,859	15 0	Siddons & Freeman£3,260	0 0
J. E. Johnson & Son 3,750	0 0	S. & E. Bentley.... 3,250	0 0
H. Vernon..... 3,490	15 10	G. F. Todd 3,185	10 7
G. Bell 3,468	0 0	A. Shaw..... 3,178	5 6
H. Shardlow..... 3,460	0 0	J. F. Price..... 3,120	0 0
Thomas Smith..... 3,417	0 0	J. H. Vickers 3,050	0 0
W. Smith & Son.... 3,405	14 0	Thomas Barker 2,987	0 0
Henry Roberts 3,395	0 0	Brown & Ball 2,949	0 0
M. S. Kitteringham 3,315	0 0	W. Moss & Son 2,879	10 0
Bramley & Kelham 3,305	0 0	J. Perkins, Lough-	
Clay Cross Company 3,300	0 0	borough * 2,845	15 7
Hodson & Sons 3,265	0 0	* Accepted.	

LONDON.—For converting [building into a public library, Brunswick-road, for the Commissioners of Public Libraries and Museums, Bromley St. Leonard. Mr. G. H. L. Stephenson, architect, 57, Moorgate-street, E.C. :—

White & Son £540		A. J. Sheffield, 94, St. Leo-	
Collins 530		nard's-road * £505	

* Accepted.

LONDON.—For alterations at "The Peacock," Cambridge-road, Bethnal Green, for Messrs. E. J. Rose & Co. Mr. Edwd. Brown, architect, Fleur-de-Lys-street, Bishopsgate :—

Hood, Bros. £1,078		Geo. E. Todd (accepted)..	£791
L. Whitehead & Co..... 860			

LONDON.—Accepted for the supply of road-materials, for the London County Council :—

Messrs. Tuff & Miskin, granite chippings, at 10s. 2d. per cubic yard; Mr. H. Covington, surface flint, at 5s. 6d. per cubic yard, for use in Battersea-dark.

Messrs. Alderton & Son, Croydon or other approved wall gravel, at 6s. 9d. per cubic yard, and Messrs. Tuff & Miskin, Croydon or other approved hoggin, at 7s. per cubic yard, for use in Brockwell-park.

Mr. G. W. Riley, best Croydon or other approved hoggin, at 5s. 6d. per cubic yard, and best Croydon or other approved walk gravel, 5s. 9d. per cubic yard; Mr. J. S. Gabriel, shell gravel at 6s. 5d. per cubic yard, for use in Dulwich-park.

Mr. R. Ballard, Hatfield gravel, at 6s. 9d. per cubic yard, and Wheathampstead hoggin, at 6s. 3d. per cubic yard; Messrs. Tuff & Miskin, shell gravel, at 6s. per cubic yard; Messrs. Stubbings & Son, sand, at 6s. per cubic yard, for use in Finsbury-park.

Mr. W. Griffiths, surface flints, at 5s. 11d. per cubic yard, hoggin at 5s. 5d. per cubic yard, granite chippings, at 10s. 2d. per cubic yard, and cockle-shell, at 4s. 11d. per cubic yard, for use in Victoria-park.

LONDON.—For rebuilding No. 96, Powis-street, Woolwich, S.E., and work-rooms in rear, for Messrs. S. H. Cuff & Co. Mr. H. H. Church, architect, William-street, Woolwich. Quantities by Mr. W. Whincop, 15, Kyverdale-road, Stoke Newington, N. :—

J. Chapman £2,570		H. L. Holloway £2,390	
Young & Lonsdale 2,424		Balaam Bros. 2,367	
Munday & Sons 2,418		Chessum & Sons..... 2,253	

LONDON.—For alterations and additions, "Telegraph" public-house, Whitechapel, E., for Mr. Charles Martin. Mr. Ernest H. Abbott, architect, 6, Warwick-court, High Holborn, London, W.C. Quantities by Mr. Alfred Johnson, 50, Imperial-buildings, Ludgate Circus, E.C. :—

T. W. Smith & Son ..£698	0 0	John Anley £671	0 0
A. Fordham 683	0 0	W. Harper 662	19 6

MANCHESTER.—Accepted at schedule of prices for paving, flagging, &c., Henrietta-street, Old Trafford, for the Stretford Local Board. Mr. Royle, Surveyor, Local Board Offices, Old Trafford, Manchester :—

Geo. Boyson, Ashton-on-Mersey.

NEWBRIDGE (Mon.).—For the erection of school buildings, for the Mynyddislwyn School Board. Mr. Geo. Kosser, architect, Victoria-buildings, Abercarn. Quantities by Mr. R. L. Roberts, Newbridge, Mon. :—

Hatherley & Carr ..£3,395	0 0	A. Richards.....£2,985	0 0
Williams & James .. 3,349	8 8	Jno. Linton 2,950	0 0
D. C. Jones & Co... 3,254	0 0	C. F. Morgan 2,920	0 0
J. Francis & Son .. 3,189	0 0	Davies Bros..... 2,885	0 1
Morgan & Evans .. 3,067	0 0	Monks & Co. 2,773	15 0
T. Westacott 3,034	10 0	Gaen Bros..... 2,746	17 0
Hy. Parfitt 3,000	0 0	John Jenkins, New-	
Dd. Lewis..... 3,000	0 0	port, Mon.*..... 2,530	0 0

* Accepted.

PENARTH.—For the execution of improvement works, Sully-terrace and Sully-place, for the Urban District Council. Mr. Edgar J. Evans, Surveyor, Council Offices, Penarth :—

W. K. Meazey £699	0 11	Escott & Ford £584	10 5
Jones & Thornley 690	1 5	Thomas Rees, Crinallt	
C. Gardner 676	4 10	Ely (accepted)..... 556	14 0

SOUTHALL (Middlesex).—For the supply of granite cubes, kerbing, &c., for the Southall-Norwood Urban District Council. Mr. Thomas Newall, Surveyor, Avenue-road, Southall :—

	100 tons Leicestershire Granite Cubes. £ s. d.	700 ft. run Norway Granite Kerbing. s. d.
A. & F. Manuelle.....	1 7 11 per ton	1 3½ per ft. run.
Tildesley, Sheppard, & Mabson.....	1 9 6 ,,	1 4½ ,,
Free & Sons	0 8 0 per yd.	1 7 ,,
E. J. Van Praagh & Co.....	1 8 6 per ton	1 2 ,,
Mowlem & Co.	1 9 9 ,,	1 4 ,,
Cooper, Bros.	—	1 2½ ,,
Wm. Griffiths	1 11 0 ,,	1 3 ,,
Ireland & Knight (rail)	1 7 0 ,,	1 5 ,,
,, (boat)....	1 6 0 ,,	1 4½ ,,
Trickett & Sons	1 12 6 ,,	1 5 ,,
J. E. Broderick & Co.	1 8 2 ,,	1 4 ,,
Wimpey & Co.	1 12 0 ,,	1 10 ,,
Newell & Robson, Warwick-road, Kensington.....	—	1 2*
W. Taylor, The Quarries, Atherston	1 5 0* ,,	—

* Accepted.

STAINES.—For the construction of sewerage and sewage-disposal works (Contract No. 1), for the Urban District Council. Mr. G. Maxwell Lawford, C.E., 13, Victoria-street, S.W. Quantities by Messrs. Pryce, Cuxson, & Leigh :—

Contract No. 1.

G. Wimpey & Co...£17,031	18 0	B. Cooke & Co.....£13,220	0 0
Geo. Osenton..... 15,538	0 0	John Mowlem & Co.,	
Geo. Bell 15,278	0 0	Westminster * .. 13,000	0 0
T. Adams 15,072	5 5	Wilkinson Bros.... 12,938	0 0
H. Hill 13,439	19 0	John Jackson..... 11,767	16 0
James Dickson 13,404	0 0		

Contract No. 2 (Engines and Ejectors).

Hughes & Lancaster, Westminster *.....£13,379 11 2

* Recommended for acceptance.

STOCKPORT.—For excavating, sewering, forming, &c., Meyer street and others for the Corporation. Mr. John Atkinson, C.E., Borough Surveyor, St. Petersgate, Stockport :—

W. C. Broadhurst & Co. £1,018	18 0	Hayes Bros. £943	19 2
Worthington & Pownall 957	8 4	Wm. Briseoe & Sons, Stockport* 923	4 4
		*Accepted.	

STOURBRIDGE.—For the supply of 2,800 tons cast-iron pipes, for the Upper Stour Valley Main Sewerage Board. Mr. E. B. Marten, C.E., and Mr. W. Fiddian, joint engineers, Church-street-chambers, Stourbridge :—

Stanton Ironworks Co. £11,820	0 0	J. & S. Roberts ..£11,420	15 6
Claycross Co..... 11,712	3 4	Cochrane & Co., Woodside Iron-	
Staveley Coal and Iron Co. 11,478	7 4	works, Dudley * 10,442	2 3
		* Accepted.	

TODMORDEN (Lancs.).—For the supply of cast-iron mains, 21-in. and 15 in. diameter, for the Urban District Council. Mr. H. Shaw, C.E., Town-hall, Todmorden :—

	Per ton.		Per ton.
John Walker £4	10 0	Cochrane & Co.....£4	2 6
Staveley Coal and Iron Co. 4	10 0	Jas. Gibb & Co..... 4	0 0
Cochrane, Grove, & Co. 4	5 0	Jas Oakes & Co. 4	0 0
Stanton Iron Works Co. 4	4 0	The Clay Cross Co.,	
J. & S. Roberts, Ltd... 4	2 6	near Chesterfield*.... 3	18 4
		* Accepted.	

TONBRIDGE (Kent).—For the formation of road, sewer, &c., through the Lyon's estate, for Mr. H. Rush, of Tonbridge. Mr. W. Barnsley Hughes, surveyor, Tunbridge Wells. Quantities by surveyor :—

Strange & Sons £2,493	0 0	G. A. Franks £2,348	11 12
Punnett & Son 2,452	0 0	John Jarvis 1,947	3
W. H. Wheeler 2,426	18 9		

TORQUAY.—For the erection of a church, Cockington. Mr. C. A. Nicholson, architect, 11, Beaumont-street, W. Quantities by Mr. J. E. Drower, 16, Great George-street, S.W.:—

		If Corsehill stone for arches, &c., add
R. Wilkins & Sons	£3,550 0	£149 0
S. Roberts	3,526 0	42 0
G. H. Wilkins	3,450 0	120 0
J. Brown	3,440 0	40 0
Chas. Cocks	3,427 10	5 0
S. Hawkins	3,375 10	*nil.*
James Julian	3,343 0	118 0
Rabbich & Brown	3,330 0	*nil.*
A. R. Lethbridge	3,320 0	130 0
Wm. A. Goss	3,251 0	*nil.*
P. Blowey	3,250 0	100 0
C. Trask & Sons	3,235 0	149 0
J. Goad & Co.	2,998 0	80 0
Claridge & Bloxham	2,900 0	210 0
W. H. Gooding	2,820 0	198 4
R. F. Yeo, Fleet-street, Torquay *	2,715 0	159 0

* Accepted.

WANSTEAD.—For making-up Camden-, Mansfield-, and Sydney-roads, for the Wanstead Urban District Council. Mr. John T. Bressey, Surveyor, Wanstead:—

William Gibbs	£398 2 3	Joseph Jackson	£269 0 0
Thomas Adams	359 0 0	William Griffiths	254 0 0
John Mowlem & Co.	332 0 0	John Reeves, High-st., Walthamstow*	238 0 0
Jesse Jackson	295 0 0		

[Surveyor's estimate, £264.]

* Accepted.

TO CORRESPONDENTS.

C. G. (parts of Islington, Hackney, Homerton, Kingsland, Dalston, Bloomsbury, Clapham, Wimbledon, and Blackheath are built on gravel; a model in the Museum of Practical Geology, Jermyn-street, gives the precise areas.—"Puzzled" (next week).—P. B. S. Co. (ditto).

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PUBLISHER'S NOTICES.

Registered Telegraphic Address, 'THE BUILDER,' LONDON.

THE INDEX and TITLE-PAGE for Volume LXVII. (July to Dec. 1894) were given as a supplement with the number for Jan. 12. last.

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Advertisements for the current week's issue are received up to THREE o'clock p.m. on THURSDAY, but "Classification" cannot be guaranteed for any which may reach the Office after HALF-PAST ONE p.m. on that day. Those intended for the front Page should be in by TWELVE noon on WEDNESDAY.

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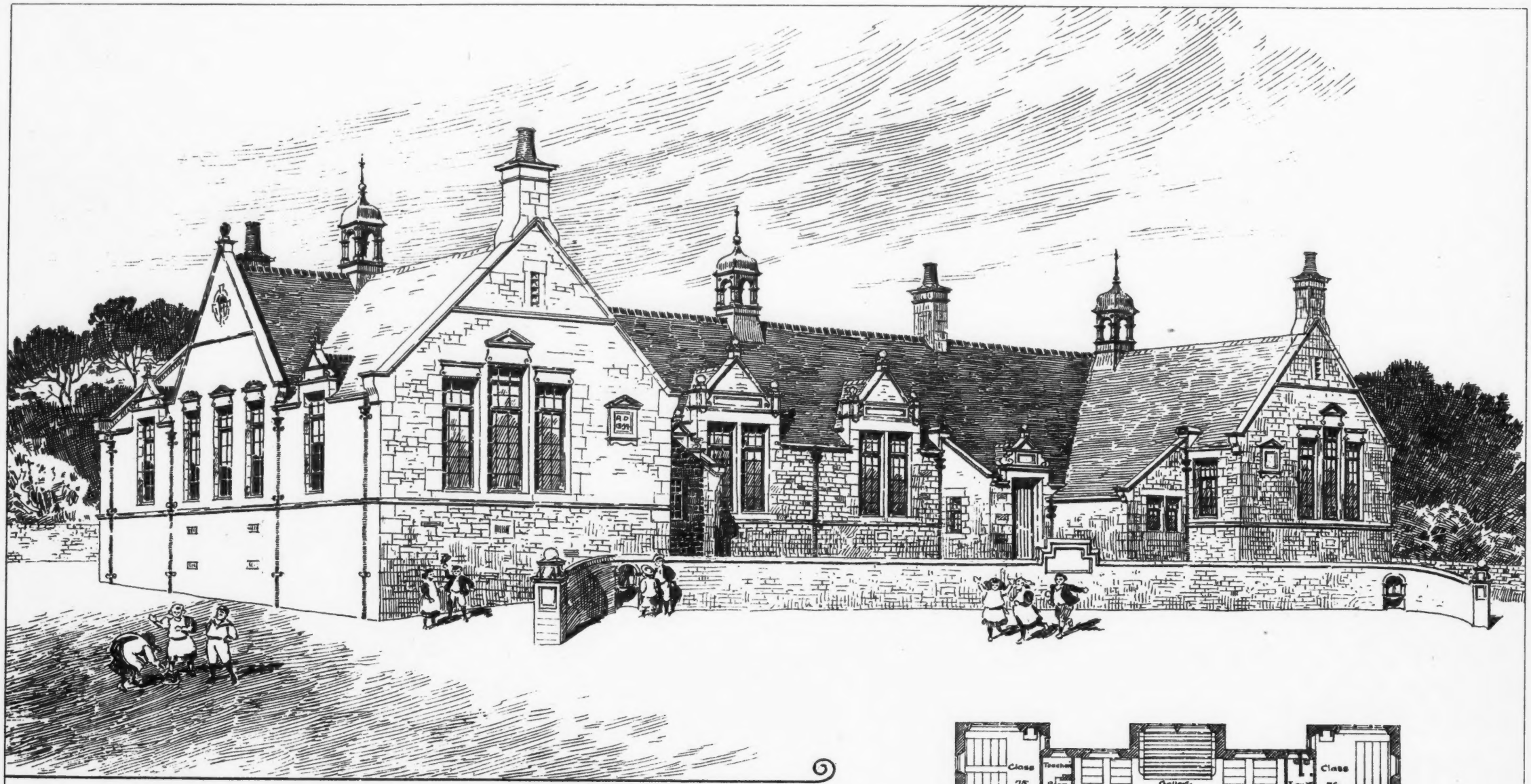

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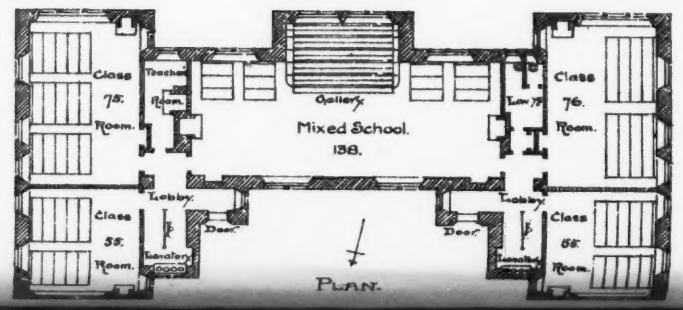
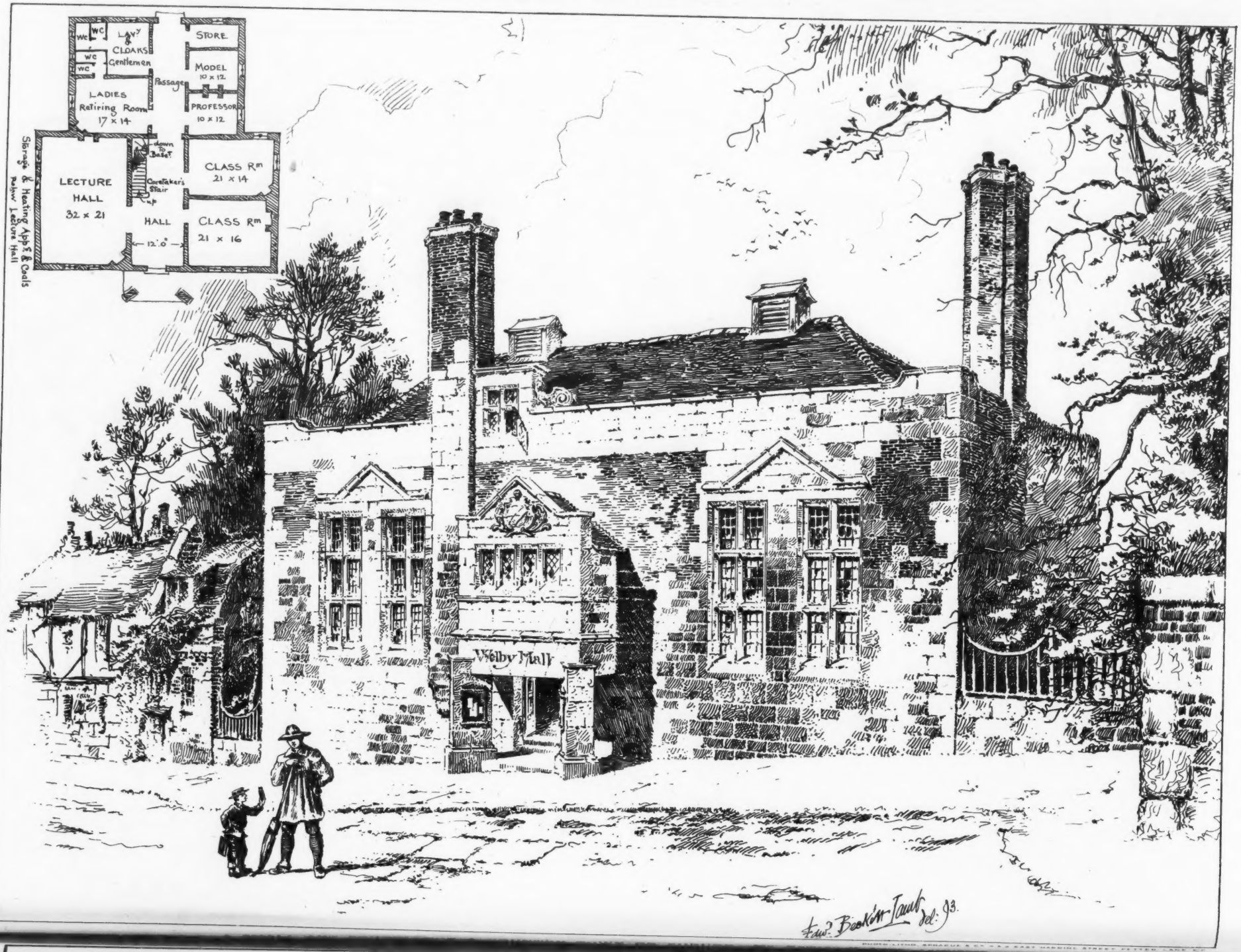
J. Graham Fairley F.R.I.B.A. Architect.



J. Graham, Fairley FRIBA.
Architect.

PLAN.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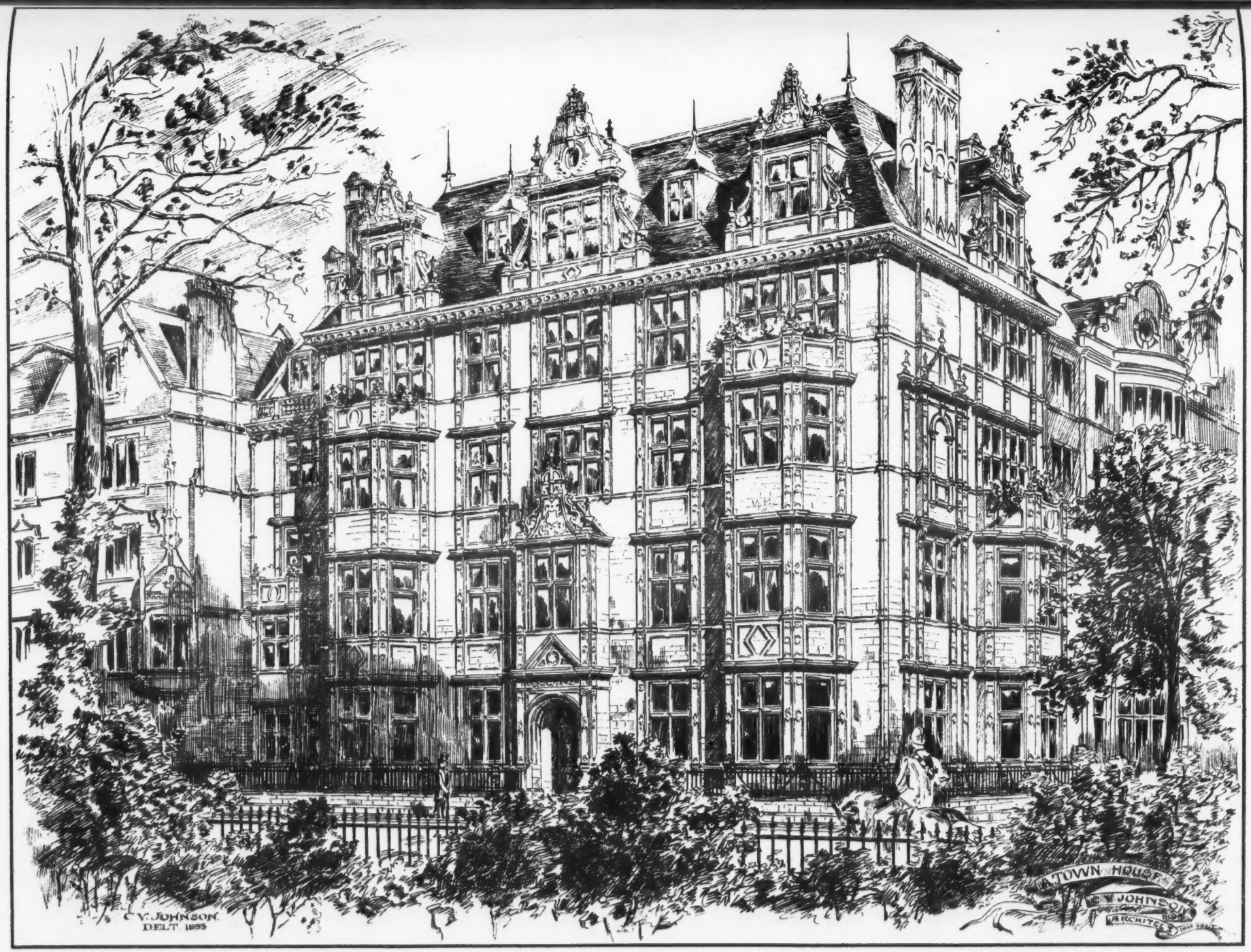
Passage
LADIES Retiring Room 17 x 14
PROFESSOR 10 x 12
down to Basement
LECTURE HALL 32 x 21
Caretaker's Stair
up
CLASS Rm 21 x 14
HALL
12'.0"
CLASS Rm 21 x 16
Storage & Heating Appts & Coals Below Lecture Hall
Welby Mall
Edw? Booker Taunt del: 93.



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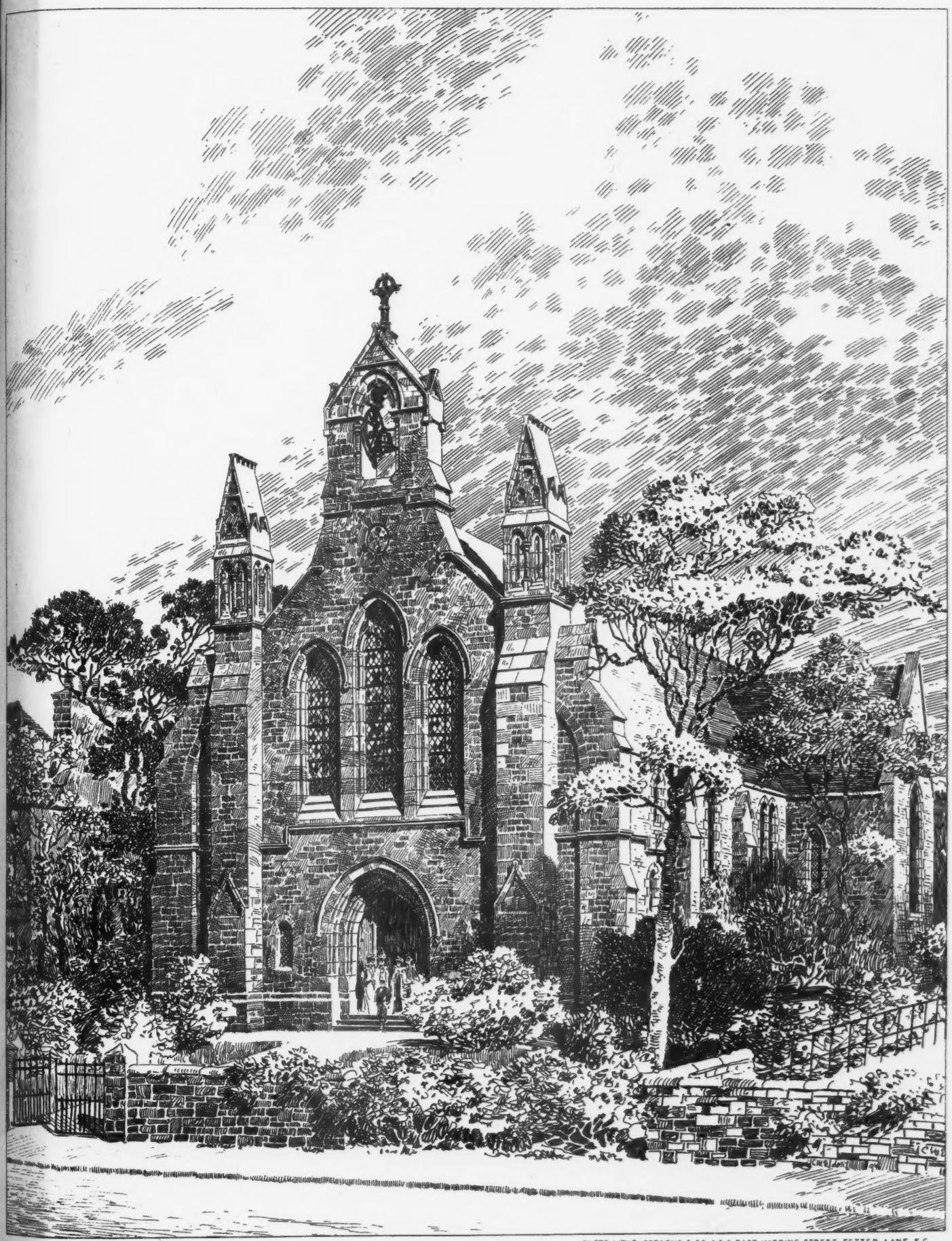
A TOWN HOUSE.—Mr. C. V. Johnson, Architect.



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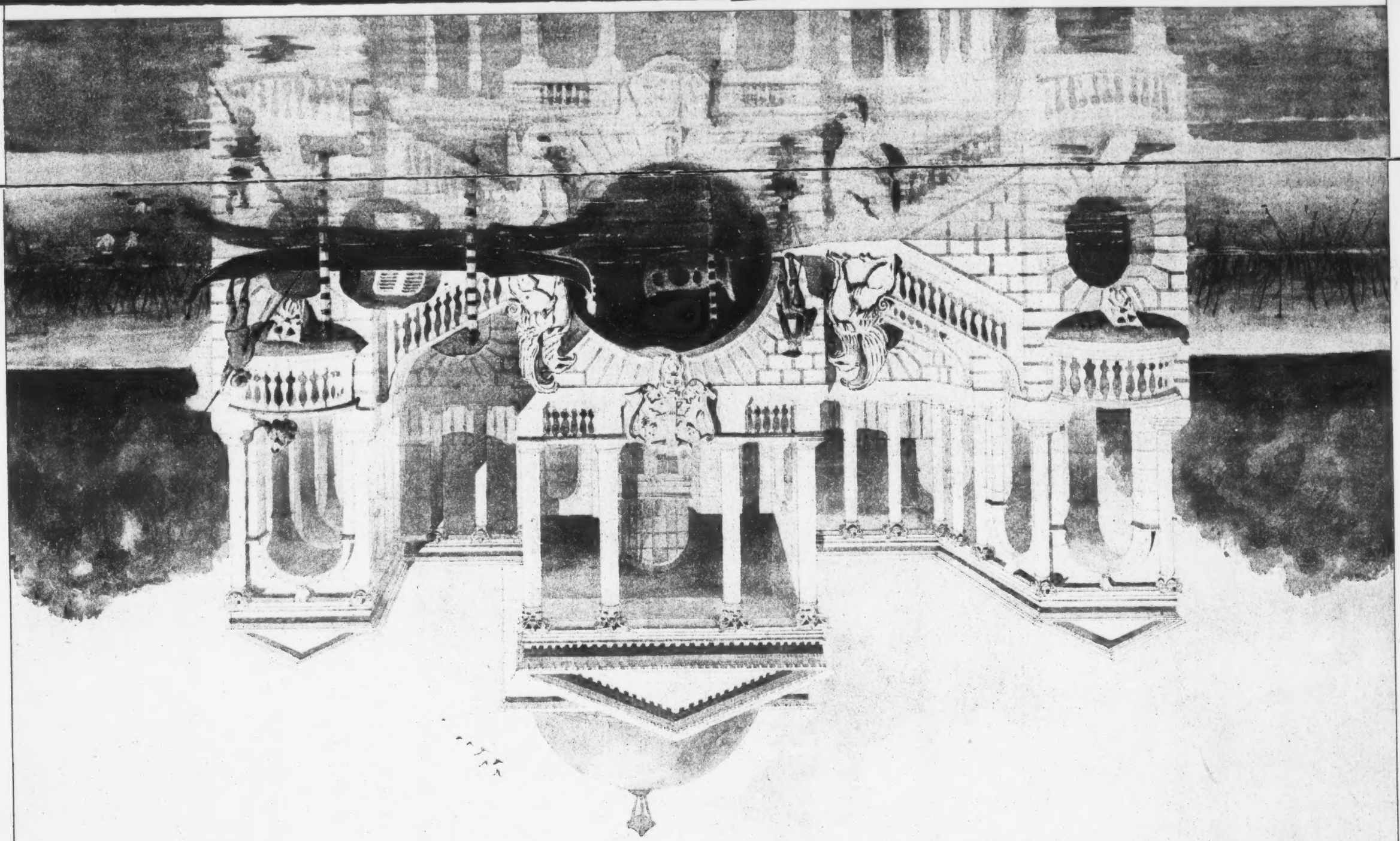
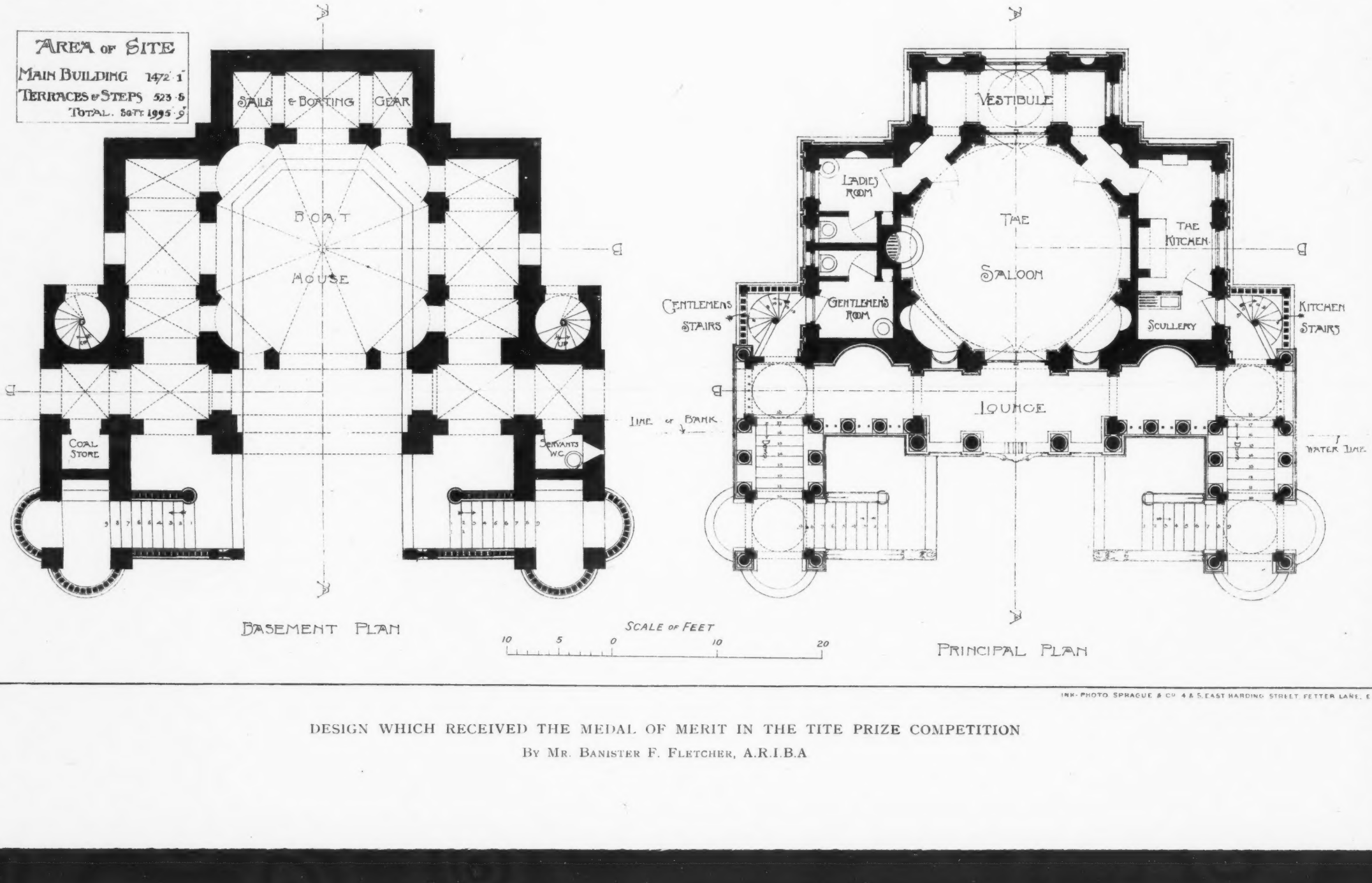
VILLAGE CHURCH, BROXBURN, WEST LOTHIAN.—Mr. J. Graham Fairley, F.R.I.B.A., Architect.



THE TITE PRIZE: R.I.B.A.
A GARDEN PAVILION



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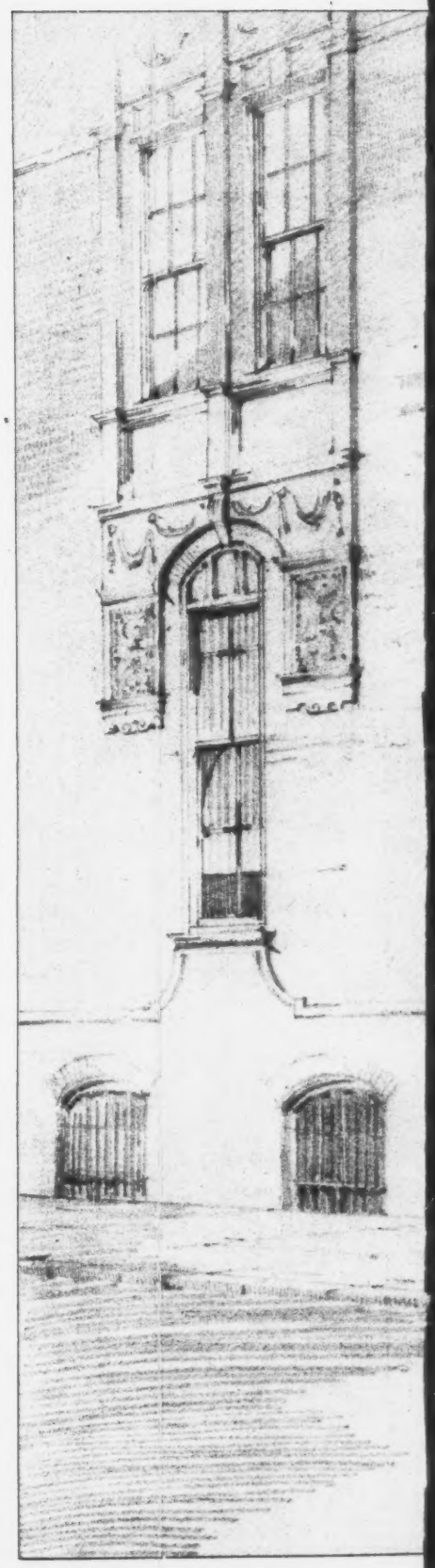
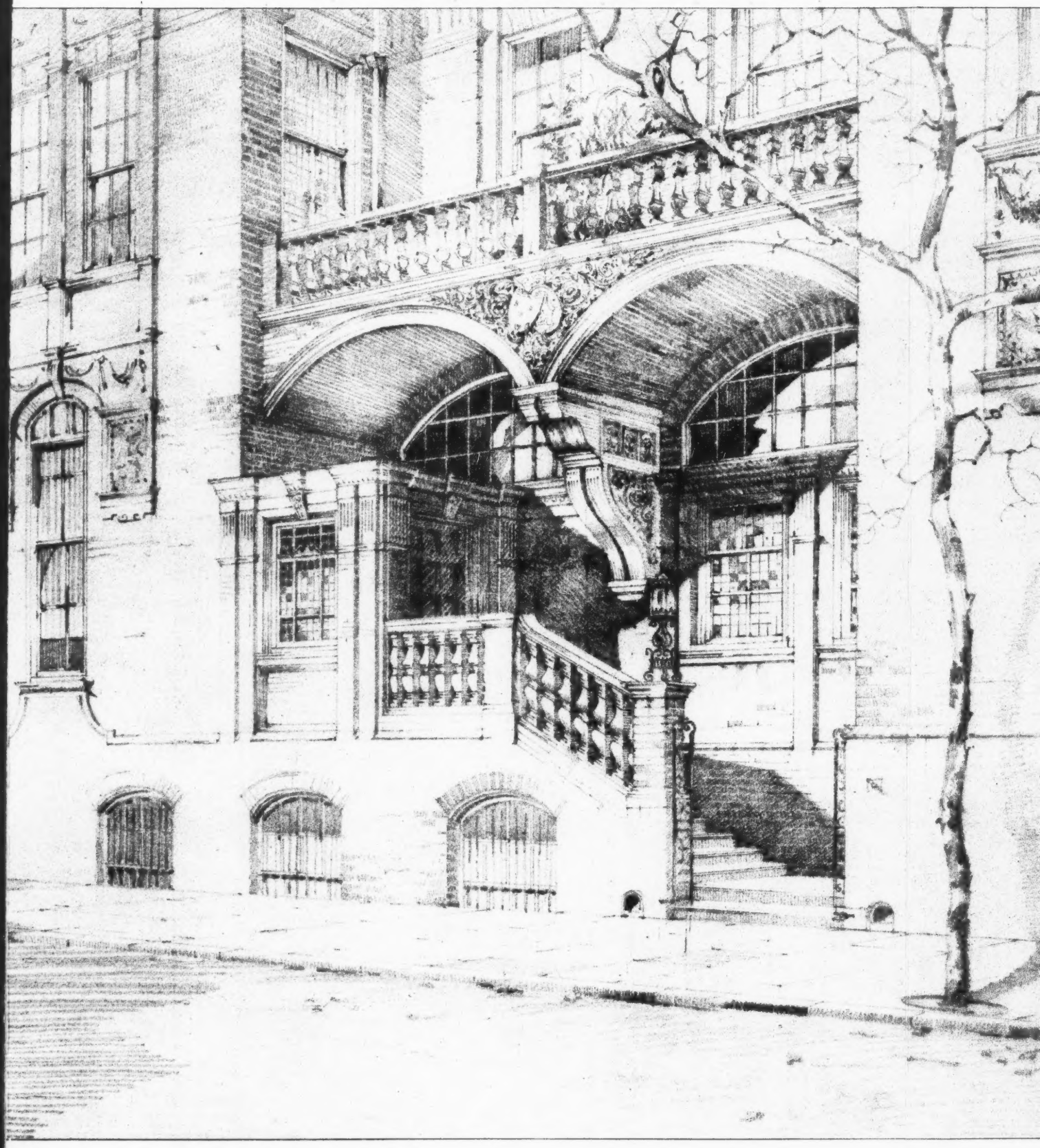
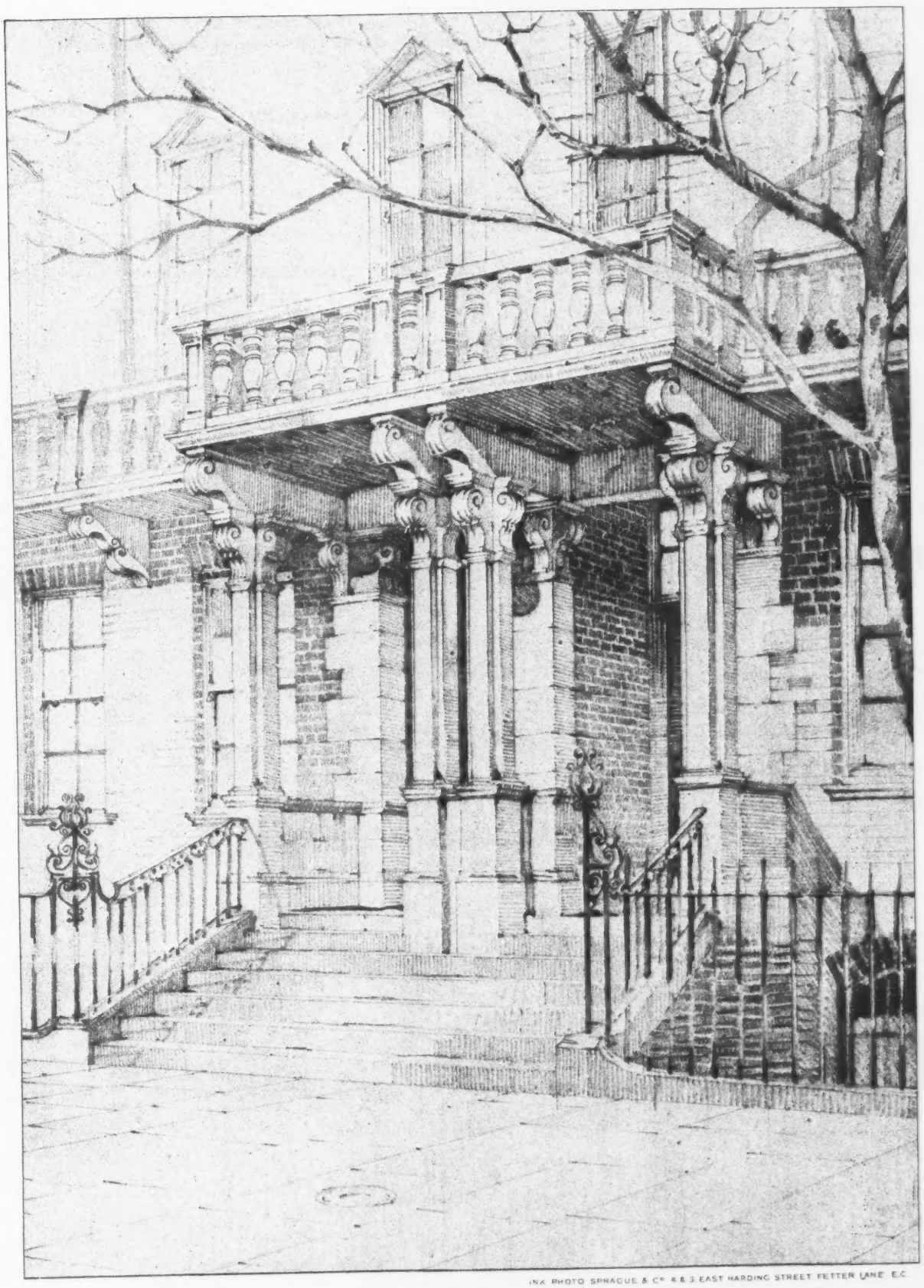
DESIGN WHICH RECEIVED THE MEDAL OF MERIT IN THE TITE PRIZE COMPETITION

By Mr. Banister F. Fletcher, A.R.I.B.A





PORCHES OF LONDON HOUSES.—Mr. J. J. Stevenson, F.R.I.B.A., Architect.



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